ON SOME NEW AND RARE AUSTRALIAN *AGRIONIDÆ* (ODONATA).

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(Plates xliv.-xlix.)

In this paper I have attempted to bring, up to date, our knowledge of the Australian *Agrionidæ*. Since the publication, in 1906, of my paper on this family,* many new species have come to light; further knowledge of species already described has been gathered; and also a study of these new forms has revealed much that is unsatisfactory in the present generic definitions. In this paper, therefore, I have attempted to put the classification of the Australian *Agrionidæ* into genera, on a firmer and more natural basis; I have also tried to supply what was so conspicuously lacking in my former paper, viz., drawings of appendages and other parts sufficiently magnified to be of real use to the student of the Order—not only for the new species described in this paper, but also for all those described as new in my former paper. I have not, however, attempted to deal with the life-histories of any species here, as these require separate treatment, and many points still remain to be elucidated,

The classification, by de Selys, of the suborder *Zygoptera* into the two families, *Calopterygidæ* and *Agrionidæ*, though accepted by nearly all present-day Odonatologists, is open to the great objection that it is unnatural, and completely obscures our view of the true phylogeny of the *Zygoptera*. As I have indicated in a former paper,† the whole tendency of the *Zygoptera* from their inception has been *asthenogenetic*; and, according as one of its

* "New Australian Species of the Family *Agrionidæ*," These Proceedings, 1906, May 30th.

† "On the Genus *Diphlebia*," These Proceedings, 1911, Vol. xxxvi., pp.600-601.

members has branched off early or late from the main reduction-movement, has stopped far short or has travelled far along the road to this end, so will it be found to possess a greater or less portion of the original characters of the *Odonata*. The great reduction of the prænodal area in the *Zygoptera* is the best illustration of this statement. Starting with a prænodal area roughly equal to half the wing-surface, we find this portion of the wing gradually reduced both in length and breadth, so that the number of antenodals rapidly fell below that of the postnodals, and finally became reduced to *two*; that being, as far as we can see, the irreducible minimum beyond which evolution has not been able to go, without sacrificing the species altogether. Now de Selys divides the whole of the *Zygoptera* up into two families, according to whether they possess more than two, or only two, antenodals. Neither the utility nor the naturalness of this was questioned, until forms like *Thaumatoneura* were discovered, possessing all the chief characteristics of the *Agrionidæ*, but with *more than two* antenodals. The need for attention to, and improvement in, the classification then became evident. The proposition may be placed before us, in the light of our present knowledge, as follows:—Assuming the *Zygoptera* to be an asthenogenetic group, and hence, that species possessing only *two* antenodals have all descended from forms possessing *more than two* antenodals (not, of course, the same forms as now exist, with more than two antenodals), let there be $x+y$ separate lines of descent in the Suborder possessing representatives at the present day. Of these, suppose that x have reached the stage of possessing only two antenodals, while y have not yet reached that stage. Then, if we adopt de Selys' classification, we should have x groups of *Agrionidæ*, and y groups of *Calopterygidæ*. But from any of the x lines of descent that led to *Agrionidæ*, offshoots may have proceeded which found their natural position of equilibrium in some form still existing with *more than two* antenodals. Let there be z of these. By de Selys' classification, these z are included in the y *Calopterygidæ*; whereas it is quite evident that they are more closely related to some of the x forms in the *Agrionidæ*.

To take an Australian example:—*Diphlebia* is more closely allied to *Podopteryx* and *Argiolestes* than it is to the great mass of *Calopterygidæ*. Yet because it has five antenodals, and *Argiolestes* only two, they are put into separate families!

The problem is admittedly a most difficult one, and the only solution lies in the detailed study of the earlier types of the *Zygoptera*, and especially of the rarer forms which may possess the key to the puzzle. Though the Australian species are nearly all classed as *Agrionidæ*, yet the work I have so far been able to do, shows the presence of at least *one* of the *z* groups of the hypothesis outlined above Much more remains to be done, and the detailed study of life-histories is reserved for other papers. But, while following, for the present, de Selys' classification as regards the *Agrionidæ*, and his subdivision of the family into "legions," I think the following points may be briefly stated here, as indicating the lines suggested so far by the study of the early stages of the Australian species:—

i. The original *Zygopterid* stock has its nearest representatives to-day in those species which possess an unspecialised larval gizzard (sixteen folds, eight minor and eight major, with a large number of *similar* teeth). This form appears to exist still in most *Calopterygidæ*, possibly not in all, but it is found also in *Argiolestes* and the Australian species of the legion *Protoneura*. *Diphlebia*, *Argiolestes*, and the legion *Protoneura* are all stages on an asthenogenetic line of descent, though the first two, as they now exist, do not probably correspond entirely with the ancestors of *Protoneura* most like them; in other words, a slight but advantageous line of specialisation has given these forms equilibrium, without forcing them to the extreme reduction-stage of *Protoneura*.

ii. *Synlestes* and *Lestes* possess a highly specialised larval gizzard of a peculiar form. In spite of some obvious venational differences, *Synlestes* is essentially *Lestine*, and has no close relationship with *Argiolestes*, its resemblance to that genus being due purely to convergence through asthenogenetic reduction on similar lines. This group is archaicly cænogenetic from the main

Zygopterid stock, but its nearest affinities amongst present-day *Calopterygidæ* still need working out.

iii. A third form of larval gizzard, also specialised, is found in the legion *Agrion*. This is another cænogenetic development away from the main stock, probably later than ii., but of considerable antiquity.

Asthenogenesis has exerted the greatest influence on i. and iii., producing such highly reduced forms as *Selysioneura*, and the Australian members of the legion *Protoneura*, on the one hand, and *Hemiphlebia*, on the other. On ii., its influence has not been so pronounced. This may, of course, indicate that *Lestes* is less archaic than we now suppose, or it may show that it is a highly successful menogenetic development from a more *Protoneura*-like set of ancestors, of which *Lestoïdea* may be the only remaining remnant. The latter supposition seems to me improbable.

It is necessary to emphasise again the fact that is becoming more and more evident, as the study of the Australian *Odonata* progresses, *viz.*, that *forms are not necessarily archaic because they are Australian*. This pious article of faith will die hard amongst European systematists, who have so long held it implicitly. The Australian *Zygoptera* illustrate very strongly the further truth, that *the Australian forms of a given group may be more advanced than the Palæarctic forms of the same group*. The Australian *Lestes* are clearly more advanced than their European congeners. They have, in fact, taken the position in nature which *Agrion* has only just reached in Europe and Asia, while our Australian representatives of the latter group show far greater asthenogenetic development than their congeners of the northern hemisphere. Again, our Australian members of the legion *Protoneura* are more advanced asthenogenetically than the main tropical stock of that legion; while our *Calopterygidæ* have progressed so far that their present-day representatives are now partly classed amongst the more archaic *Agrionidæ*, being represented by the genera *Diphlebia*, *Podopteryx*, *Argiolestes*, and *Synlestes*,

The following is a list of the genera and species dealt with in this paper:—

Legion i. **Podagrion.**

1. *Argiolestes icteromelas* Selys, and race *nobilis.*
2. *Argiolestes griseus* Selys, and races *intermedius, eboracus* and *tenuis.*
3. *Argiolestes aureus* Tillyard.
4. *Argiolestes minimus* Tillyard.
5. *Argiolestes amabilis* Foërster.
6. *Argiolestes alpinus,* n.sp.
7. *Argiolestes fontanus,* n.sp.

Legion ii. **Lestes.**

Austrolestes, n.g.(Type, *Lestes cingulatus* Burm.).

8. *Austrolestes alleni,* n.sp.
9. *Austrolestes insularis,* n.sp.
10. *Austrolestes tenuissimus* Tillyard.
11. *Austrolestes paludosus* Tillyard.
12. *Austrolestes aridus* Tillyard.

Legion iii. **Lestoidea,** legio nova.

Lestoidea, n.g.(Type, *Lestoïdea conjuncta,* n.sp.),

13. *Lestoïdea conjuncta,* n.sp.

Legion iv. **Protoneura.**

14. *Nososticta solida* Selys.

Notoneura, n.g.(Type, *Alloneura solitaria* Tillyard).

15. *Notoneura solitaria* Tillyard.
16. *Notoneura cælestina* Tillyard.
17. *Isosticta simplex* Martin.
18. *Isosticta banksi,* n.sp.
19. *Austrostieta fieldi* Tillyard.

Neosticta, n.g.(Type, *Neosticta canescens,* n.sp.).

20. *Neosticta canescens,* n.sp.

ORISTICTA, n.g.(Type, *Oristicta filicicola*, n.sp.).

Legion v. **Agrion.**

20. *bis. Oristicta filicicola*, n.sp.
21. *Agrion lyelli*, n.sp.
22. *Ischnura heterosticta* Burm., and race *tasmanica*.
23. *Ischnura torresiana*, n.sp.
24. *Ischnura pruinescens* Tillyard.
25. *Argiocnemis rubescens* Selys.

AUSTROCNEMIS, n.g.(Type, *Agriocnemis splendida* Martin).

26. *Austrocnemis splendida* Martin.
27. *Agriocnemis hyacinthus*, n.sp.
28. *Agriocnemis rubricauda*, n.sp.
29. *Agriocnemis argentea* Tillyard.
30. *Agriocnemis exsudans* Selys(New Hebrides).
31. *Hemiphlebia mirabilis* Selys.

XANTHOCNEMIS, n.g.(Type, *Xanthagrion zelandicum* Selys).

32. *Xanthocnemis zelandica* Selys(New Zealand).
33. *Xanthagrion erythroneurum* Selys.

AUSTROAGRION, n.g.(Type, *Psendagrion cyane* Selys).

34. *Austroagrion cyane* Selys.
35. *Austroagrion cæruleum* Tillyard.

CALIAGRION, n.g.(Type, *Pseudagrion billinghursti* Martin).

36. *Caliagrion billinghursti* Martin.
37. *Pseudagrion ignifer* Tillyard.
38. *Pseudagrion australasiæ* Selys.
39. *Pseudagrion aureofrons* Tillyard.
40. *Ceriagrion glabrum* Burm.
41. *Aciagrion fragilis* Tillyard.
42. *Stenobasis mimetes*, n.sp.
43. *Telebasis rufithorax* Selys.

Legion i. **Podagrion.**

1. Argiolestes icteromelas Selys.

(Plate xliv., figs.1-2.)

A very great variation in size and markings is found in this very common species. Specimens from the extreme south (Melbourne) and north (Herberton, N. Queensland) of its range are the smallest, while those from near the centre are usually larger. The smaller specimens have the greater tendency towards dark markings (brown, orange, or dark grey), the larger towards light markings (yellow, cream, white, pale blue, pink, and pale green), but brownish or pale yellow markings are by far the commonest.

Race *nobilis*:—*Total length*, ♂40, ♀44; *abdomen*, ♂39·5, ♀34·5; *hindwing*, ♂32, ♀33.

This fine race occurs on the Dorrigo Plateau, N.S.W., and especially at Ebor(4,000-4,500 feet above sea-level). It differs from the type-form not only in size, but in its very robust build, and in a much greater tendency towards pruinescence, giving the insect a much greyer appearance. The male appendages are similar to those of de Selys' type-form, but larger and thicker. [Figures of these appendages are given in Plate xliv., figs.1-2, for the purpose of comparison with other species of the genus].

2. Argiolestes griseus* Hagen-Selys.

This species, which seems to be confined to the mountainous districts of New South Wales and Victoria, where it is not uncommon, is very variable both in size and colouring. The grey pruinescence of the males is not assumed until the insect is some weeks old, immature males having the colouring of the female; and the majority of specimens taken in November or December will be found to have the greyness only partially developed, the commonest form being that in which only the thorax and the base of the abdomen are pruinescent. As the female of this

* Greek λῃστής = a robber or pirate, *masculine* (rarely used in the common gender). I have therefore treated *Lestes* and its derivations as masculine, though de Selys used feminine terminations with them.

species has never been described, and as de Selys' description applies only to a *unique* and somewhat immature male in Hagen's collection, I give below a short description of my own series, with a special description of a female type.

A. *Blue Mountain Series.*—Specimens from this locality seem to be identical with de Selys' type-male (locality "New Holland"), especially as regards size, number of antenodals, and form of pterostigma.

♂. *Total length* 32; *abdomen*, 26; *forewing*, 21; *hindwing*, 20 mm.

Wings lightly suffused with a brownish tinge, *postnodals* 13-17, *pterostigma* very dark brown, 1·2 mm., slightly trapezoidal. Head black, *labium* and sides of face next to eyes straw-coloured. Thorax: *prothorax* black with a yellowish band on each side. *Meso-* and *metathorax* black, with a slender humeral band in two pieces, separated by a fine black stem; the forward portion of the band slightly convex to dorsal ridge, the hinder, slightly subhumeral, concave, shorter and pointed forward; colour of band usually straw or yellowish, but suffused with grey pruinescence in very mature specimens; rest of sides black, with two slanting yellowish intrusions, 1·5 mm. long and very slender, from the pale yellow underside. *Legs* black, with pale underside to femora. Abdomen very cylindrical, rather slender in some specimens, stouter in others; metallic bronzy-black marked as follows:—sides of 1 and a lateral stripe on 2, ochreous; 3-7, a small ochreous basal spot on each side. After the insect has been on the wing for some time, a grey pruinescence begins to form in a very beautiful manner and in the following order:—firstly, a beautiful dorsal mark on 2, in form usually like a cup with a short stem and long body; together with a touch of grey on 1. Then, on 3, the dorsal area becomes entirely pruinescent except for two conspicuous black spots near apex; then 4, similarly; then 5, and finally 6 and 7, the pruinescence being, of course, most marked at any given stage on 2 and the segments following. In my series, *the majority of specimens* are *not* pruinescent; a few are pruinescent on 1-2 or 1-3 only, one or two on 1-5, and several on 1-7, this being the limit as far as I can ascertain. Segments 8-10 black, often with a distinct bronze tint; 10 very short. Appendages:

superior 1·2 mm, black, slender, forcipate, with an inner inferior shelf or lobe towards tips ending suddenly so as to leave the tips projecting suddenly and sharply above it. (This form seems to be a modification of the lobe and spine arrangement found in the larger species of the genus). On the apical portion, above, a series of very small sharp teeth or spines is placed. *Inferior* 0·3 mm., brownish, subcornute, rather blunt and usually bent inwards towards one another.(See Plate xliv., figs.3, 4).

♀.*Total length* 30·5, *abdomen* 24, *hindwing* 20·5 mm. Very similar to male, but without any pruinescence; wings slightly broader and more rounded at tips; bands of thorax slightly paler; abdomen quite cylindrical but scarcely thicker than in male, bronzy-black, with very little yellow on sides of 1-2, and very small basal spots on each side of 3-6. *Appendages* 0·3 mm., wide apart, black, pointed. *Ovipositor* black, reaching to end of appendages.

Types:—♂ immature, Coll. Hagen("New Holland"); ♂♂ immature and mature, and ♀, Coll. Tillyard(Blue Mountains, N.S.W.).

B. Race *intermedius*.—A small series of three males and one female taken by me at Alexandra, Vic., December, 1906, are of intermediate form between typical specimens (A) and the very distinct form *eboracus*(C).

Total length, ♂34, ♀32; *abdomen*, ♂27, ♀24·5; *hindwing*, ♂♀ 22 mm.

♂.Vertex, thorax, and whole of abdomen covered with grey pruinescence above, but not so thickly as in mature males of A; nor is there any pattern on the abdomen, the whole dorsal surface being equally and lightly powdered. Abdomen stouter than in A, being a good 1 mm. wide. Wings very distinctly shaded with brown all over. ♀.Similar to male but with thicker and shorter abdomen, and no pruinescence. Appendages: ♂.*superior* similar to those of A, but not so slender, tips slightly blunter, inferior lobe less pronounced; *inferior* slightly closer and thicker than in A. ♀.Scarcely as long as in A, broader at base, separated by a large brown tubercle beneath and between them.

Types: ♂♀, Coll. Tillyard (Alexandra, Vic.). Specimens from Mittagong, N.S.W., have the stature of B, but the pruinescence as in A, and may be considered as connecting these two forms.

C. Race *eboracus*.—A short series taken by me at Ebor and Dorrigo, N.S.W.,(where this species is quite common) for comparison with the type-form A, shows such remarkable differences that one would almost certainly consider them as a distinct species, were it not for the existence of the connecting form B.

Total length, ♂ 28, ♀ 30·5; *abdomen*, ♂ 30, ♀ 24; *hindwing*, ♂♀, 24 mm.

Wings broad and well rounded in both sexes; vertex of male pruinescent; upper part of thorax completely covered with thick grey pruinescence, almost completely hiding the humeral bands. *No pruinescence on abdomen* of ♂: ♀ with no pruinescence. *Appendages*: ♂, *superior* 1·2 mm., very slender, of typical A form; *inferior* very short, 0·2 mm., blackish, and inclined inwards very much towards one another: ♀, as in form A. *Abdomen* of ♂ very long, fairly stout; that of ♀ very short and much stouter than in A or B.

This form, so large and distinct in appearance from the type, corresponds with the race *nobilis*(see above) of *A. icteromelas* Selys, from the same locality. I am inclined to regard these large alpine forms as being the most archaic forms, the others being asthenogenetic or reduction-stages brought about by the more strenuous competition with a more numerous *Agrionid* fauna in the less elevated and coastal regions. The fact that the type-form, however, is also alpine, reaching from 2,000 to 4,000 feet on the Blue Mountains, is difficult of explanation, except on the grounds that this remarkable mountain range possesses in many ways a fauna of its own, while the more truly alpine forms of the great ranges of Victoria and Southern New South Wales are found repeated *further north and at a less elevation* on the high tablelands of Ebor and Dorrigo.

Types: ♂♀, Coll. Tillyard(Ebor, N.S.W.).

D. Race *tenuis*.—A single male, taken at Hornsby, N.S.W., December, 1909, and hence at a lower elevation and much nearer

the coast than any of the preceding forms, is of the very slender build found in *A. fontanus*, n.sp. In markings, it is similar to the immature males of type-form A. *Wings* hyaline, narrow; *pterostigma* 1 mm., narrow, black. *Thorax* and *abdomen* very slender. *Abdomen* bronze, marked as in A *Appendages*: *superior* as in A; *inferior* very much bent, practically forcipate.

Total length 34; *abdomen*, 27; *hindwing*, 21 mm.

Type: ♂, Coll. Tillyard.

E. Race *albescens*. —♂. *Total length*, 34-38; *abdomen*, 27·5-30; *fore* and *hindwing*, 20-21·5 mm., of equal length. ♀.35, 27, 22 mm. for corresponding measurements.

A very distinct race discovered by Mr. H. Hacker, of the Queensland Museum, on Stradbroke Island, S. Queensland. This is by far the most northerly record for this variable species. I have examined a fine series of thirteen males and six females, taken from beginning of October, 1911, right up to the middle of May, 1912. A striking peculiarity is the extreme shortness and rotundity of the forewing in nearly all the males; the actual length being only just equal to that of the hindwing, makes the insect appear as if the forewing were stunted, and the bluntness of the tip increases this effect. A similar but not so striking effect is seen in *Argiolestes alpinus* Tillyard. The formation of pruinescence in the males is very remarkable. Specimens taken in October have no pruinescence, and resemble the type-form in colouration. Specimens taken from February to May show a growth of very white pruinescence as follows: on the thorax, it begins as a pair of slanting bands starting dorsally from close up to prothorax and diverging laterally towards the wing-bases; when mature, it appears almost like a thick fungus-growth, pure white, and covering the dorsal part of the prothorax, and all the thorax, except a small lateral area above mesocoxa and a large subtriangular dorsal area with a spur running up to prothorax. On the abdomen, it forms a pattern on 1-2, having an apical black band and two black spots; 3-7 are untouched by it, 8-10 completely covered dorsally; appendages untouched. [In the

type-form, pruinescence spreads from 2 downwards to 7, and is grey]. The six females examined, all taken in October, are similar to type-form, but with more rounded wings; segment 9 shows slight pruinescence. Pterostigma of both sexes shorter (1 mm.), and thicker than in type-form.

Types: Queensland Museum and Coll. Tillyard

3. Argiolestes aureus Tillyard.

Tillyard, These Proceedings, 1906, xxxi., p.178.

♂.Appendages: *superior* 1·5 mm., black, forcipate; in profile slightly waved, and carrying a very small spine underneath, one-third from apex; *inferior* very short, thick, flat(Plate xlv., figs.1, 2).

Hab.—Kuranda, N. Queensland. Very rare.

Types: ♂♀.Coll. Tillyard.

4. Argiolestes minimus Tillyard.

Tillyard, These Proceedings, 1907, xxxii., p.735.

♂.Appendages: *superior* 1 mm., black, forcipate, slender; *no spine* on the inner margin, but a small curved lobe about one-third from apex, having a slight notch or angle in it. (I regret that this was originally described as "a small spine on the inner margin" owing to the type-specimen having one lobe torn, and a remnant left which appeared like a small spine); in profile, nearly straight, blunt; outer margin, viewed dorsally, furnished with some tiny spines, and four on the apical half, somewhat more conspicuous; *inferior* 0·25 mm., curved and pointed(Plate xlv., figs.3, 4).

5. Argiolestes amabilis Foërster.

Ann. Soc. Ent. de Belgique, xliii., 1899, p.71(description of a unique ♀ from New South Wales).

♂.*Total length* 42, *abdomen* 33, *forewing* 27, *hindwing* 27 mm.

Wings hyaline, *all four of same length*, making the forewing expanse less than that of the hindwing, both when folded and outspread; *postnodals* 20-22, *pterostigma* 1·2 mm., very thick, jet black. Head: *vertex* black; central ocellus transparent; a tiny orange spot bordering each eye above; *front*, *clypeus* and *labrum*

all bright orange-red, a fine black line at base of front, in suture; *labium* black. Thorax: *prothorax* black, an orange collar in front, two large central orange spots, and two small orange spots behind. *Meso-* and *metathorax* marked with bright orange (or orange-red) and black, as follows:—a broad dorsal black band widening slightly towards interalar ridge, where it spreads out into two small projections, one on each side; on each side of this band is a broad, rather irregular orange band, covering rest of dorsal and upper part of lateral surface; below this, an irregular black area cutting into the orange area above it, about midway, by a right-angled projection; rest of sides and underside dull orange (See Plate xliv., figs.5-6). *Legs* black; measurements of foreleg:—femur 3, tibia 4, tarsus 1·5 mm. Abdomen slender, 1-2 very slightly enlarged, 3-7 cylindrical, 8-10 widening considerably, 10 being widest. *Colour*: 1, black, an irregular transverse apical orange band; 2, dorsum orange, sides black, the latter encroaching on the orange apically; 3-6 black, a small basal orange mark on each side; 7-10 jet black. Appendages: *superior* 1·4 mm., black, thick, forcipate; basal half swollen, apical half with an internal narrow shelf curving round near middle of appendage so as to leave a small hole nearly enclosed between it and the enlarged basal part; towards the tips, a large inferior projecting spine; tips rough and blunt. *Inferior* minute, truncated, black(Plate xliv., figs.5,6).

♀. *Total length* 40, *abdomen* 31, *hindwing* 29·5 mm. It differs from the male in possessing a *steely metallic labrum*, a broader spread of wing, a shorter, thicker and more cylindrical abdomen. Basal orange spots of segment 3 meeting dorsally to form a band, those of 4-6 larger than in male. *Appendages* 0·5 mm., black, pointed; *ovipositor* large, upcurved, black, projecting beyond end of appendages.

Hab.—Dorrigo, N.S.W., 2,500 feet; November-December, 1911.

It occurs only on the small running creeks in the densest scrub, where very little sunlight penetrates. Two things struck me as remarkable about this species. Firstly, the females were more than twice as numerous as the males. I took nineteen females, but only nine males, though the latter were especially searched

for, and the females occasionally ignored. It is possible that most of the males ascend to the tops of the giant forest-trees, to disport in the sunshine. Secondly, the brilliant colouring of this insect harmonised wonderfully with the colours of the dense scrub. In the almost semi-darkness of these deep recesses, the brilliant orange display of a male sitting on a tree-fern frond was almost lost to view. Further than that, the few patches of sunlight that filter down into the creeks or narrow glades are of a distinct orange tint, and, in these patches, the insect disported itself without appearing at all conspicuous. I could scarcely resist the conclusion that *the orange colouring of this remarkable insect was the direct result of the filtered orange light acting chemically on some complicated pigment of the thorax*, and was certainly not caused by any purely evolutionary development for protective purposes only. These insects usually sit about on twigs or on the fronds of ferns, and fly very little even on the brightest and warmest days.

Types: ♀(N.S.W.),Coll. Foërster; ♂♀(Dorrigo), Coll. Tillyard.

Closely allied to *A. aureus* Tillyard, from Kuranda, from which it differs in its much larger size, more robust build, darker colouration, different thoracic colour-pattern, and especially by the huge inferior projecting tooth or spine on the superior appendages of the male.

6. Argiolestes alpinus, n.sp.

♂. *Total length* 46, *abdomen* 36, *forewing* 30, *hindwing* 30 mm.

Wings hyaline, forewing and hindwing of same length, so that the former appears shorter than the latter, both when folded and outspread; *postnodals* 20, *pterostigma* 1·5 mm., thick, black. Head: *vertex* black, a large pale blue spot behind each eye; in front, a large straw-coloured mark between each eye and the face; *front* black, *clypeus* black with a pale central spot; *labrum* dark metallic green, *labium* dirty brown edged with black. Thorax: *prothorax* pale pruinescent-blue with a dorsal black blotch. *Meso-* and *metathorax* bright blue, downy, with a broad black dorsal mark in

the form of an elongated bishop's mitre; sides blue with irregular black lines in sutures, underside greyish. *Legs* black, slender; measurements of foreleg, femur 4, tibia 4-5, tarsus 1·7 mm. *Notum* largely powdered with blue. Abdomen: 1-2 slightly enlarged, downy; 3-8 slender, cylindrical; 9-10 much enlarged. *Colour*: 1, pale bluish with a transverse basal black band; 2, metallic bronzy black powdered with blue at each end, two pale spots low down on each side; 3-10 metallic bronzy black, with a conspicuous white rounded spot on each side at bases of 3-7; underside blackish powdered with grey basally on 1-8. Appendages: *superior* large, black, 1·8 mm., bases straight and much swollen for 0·4 mm., rest of appendages forcipate and tapering; a fairly large inferior spine or tooth about one-fourth of the total length from the tips. *Inferior* small, pale, flat, brownish (Plate xliv., figs. 7, 8.).

♀. *Total length* 43, *abdomen* 32·5, *wings* 30 mm. It differs from the male in having broader wings, a larger pterostigma, very pale in centre, with darker edges; also the thoracic pattern is brown instead of blue, as in the male. (In one of my specimens, however, probably immature, the pattern is pale blue). *Abdomen* thicker and more cylindrical than in male; colour metallic blackish; 1 with a dorsal brown blotch; 2-7 with a small pale basal mark on each side; 8 with a brownish transverse band at base, and a broader brown band at apex, crossed in middle by a dorsal blackish line; 10 narrower than 9. *Appendages* 0·5 mm., black, pointed; *ovipositor* brownish edged with black reaching just beyond edge of segment 10.

Hab.—Ebor, N.S.W., altitude 4600-4800 feet; January, 1912.

Nineteen males and seven females were taken. The males are very conspicuous, and easy to capture, as they sit poised on the long grass and sedge growing on the damp hill-slopes at the top of the watershed. Their flight is not strong, though their wings move rapidly. The females are much rarer than the males, and much less conspicuous.

This species is most allied to *A. icteromelas*, which it closely resembles in form. It can,however, be readily distinguished from the latter species by its colouration, its much thicker pterostigma, by the considerably longer appendages of the male, and by the wings being all of the same length.

Types: ♂ ♀, Coll. Tillyard.

7. Argiolestes fontanus, n.sp.

♂. *Total length* 37, *abdomen* 30, *forewing* 24, *hindwing* 23 mm.

Wings tinged with light brown; *postnodals*, fore 18-19, hind 15-16; *pterostigma* 1 mm. thick, black. Head completely black, except a large squarish ochreous patch between the face and each eye. Thorax: *prothorax* black, with yellowish-brown spots in front and on sides, also a narrow collar of the same colour behind. *Meso-* and *metathorax* black; on each side a narrow humeral yellowish-brown stripe, 3 mm. long, not reaching interalar ridge; sides irregularly striped with black and yellowish-brown. *Legs* black, slender, rather short. Abdomen very slender, nearly cylindrical, 1-2 and 8-10 very slightly enlarged. *Colour*: 1-2 metallic greenish-black, a pale ochreous stripe low down on each side; rest dull black. Appendages: *superior very forcipate*, 1 mm., black, very slender, apical portion turned sharply inwards, almost at right angles to the rest of the appendages, and carrying an interior projecting leaf or shelf. Seen in profile, they are curved into a low arch, with base and tips enlarged; *no large inferior spine*. *Inferior* 0·1 mm., triangular (Plate xliv., figs. 9, 10.).

♀. *Total length* 33, *abdomen* 26, wings 25 and 24 mm. It differs from the male in having broader thoracic markings of straw-colour: abdomen shorter and slightly broader. *Appendages* 0·4 mm., black, sharply pointed. *Ovipositor* black, large, but not reaching beyond end of abdomen.

Hab.—Dorrigo, N.S.W.; twelve males and two females: also a single, slightly smaller male taken on the Bellinger River, at Thorah; December, 1911.

The Dorrigo series were all found either settled upon or flying round the ferns which clustered on the steep, rocky sides of a small waterfall, about twenty feet high, in dense scrub. Compare the account of habits of *Oristicta filicicola*, n.sp., below). The single Bellinger male was found sitting on a hanging mass of creepers over a small creek, just near its entrance into the river. Two other males were also seen flying about dense vegetation near a waterfall, half-way up the range, between the above localities. Hence this species ranges from near sea-level to 2,500 feet.

Allied to *A. griseus* Selys, and *A. minimus* Tillyard(W.A.). In colouring, it is not unlike an immature *A. griseus* without any grey pruinescence, but it can be distinguished at once from that species by its much slenderer build, smaller pterostigma and much narrower wings: in particular, the spaces between costal and radian nervures, and between the latter and the principal sector, *beyond the nodus*, are very much narrower than in *A. griseus*. The form of the appendages of the male is very different from that of *A. griseus*, for, in the latter, the superior are inclined much more gently towards the tips, and the inferior are truncated, not triangular. From *A. minimus*, it differs in its greater size, more rounded wings, shorter, thicker, and darker pterostigma, and notably in the colour-pattern of the thorax, and shape of appendages of male. It also resembles, at first sight, a very small specimen of *A. icteromelas*, but is, in reality, very different from that species, especially in being uniformly hairless, and in lacking the strong inferior spine on the male appendages.

Types: ♂♀, Coll. Tillyard(Dorrigo, N.S.W.).

Key to the Australian Species of the Genus Argiolestes.

Large species(♂, abdomen 30-40 mm.), with a conspicuous inferior spine or tooth on appendages of male.	1.
Small to medium species(♂, abdomen 20-30 mm.), *without* a conspicuous inferior spine on appendages of male	2.

1	Inferior spine of male enormous; colour red and black	*A. amabilis* Foërster.
	Inferior spine of male prominent, but not enormous	3.
2	Appendages of ♂ thickened, with a tiny inferior spine; colour gold and black	*A. aureus* Tillyard.
	Appendages of ♂ slender; colouration dull	4.
3	Dorsal bands of thorax broad, blue in ♂, brown in ♀	*A. alpinus*, n.sp.
	Thorax black, with slender humeral stripes	*A. icteromelas* Selys.
4	Appendages of ♂ very forcipate, bent inwards almost at right angles	*A. fontanus*, n.sp.
	Appendages of ♂ not so forcipate, tips slanting towards one another	5.
5	Robust species, with grey pruinescence when mature	*A. griseus* Hagen.
	Very slender species, never pruinescent	*A minimus* Tillyard.

Legion ii. **Lestes.***

AUSTROLESTES, n.g.

Characters of *Lestes* Leach, and Selys, *second section*, with the important addition that the wings are *not* spread out horizontally in repose, but are *completely folded back* (as in most other *Agrionidæ*).

Type: *Lestes cingulatus* Burm.

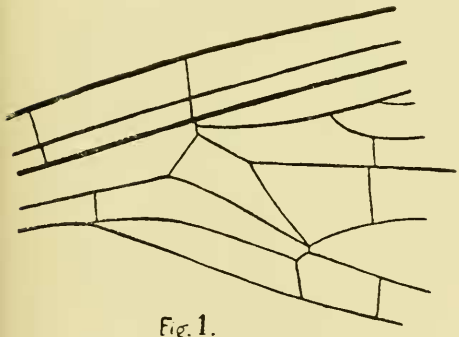

Fig. 1.

Fig. 1. — *Lestes viridis* Vanderlinden; portion of forewing.

Fig. 2.

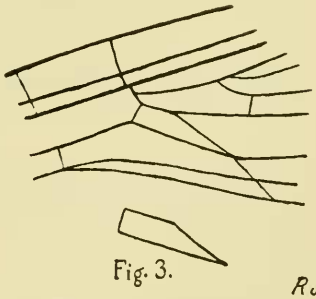

Fig. 3.

R.J.T. del

Fig. 2. — *Lestes cingulatus* Selys; portion of forewing.
Fig. 3, quadrilateral of hindwing.

The genus *Lestes* contains a very large number of species, and has become somewhat unwieldy. De Selys himself indicated a

* See footnote, p. 410.

good point from which a subdivision might be made, when he divided the genus into two sections, distinguished by the form of the quadrilateral. In all the Australian species, together with a few from outside Australia, the quadrilateral is of a very different shape from that of the more typical *Lestes* of de Selys' *first section*. In the text-figures, I have given the forewing-venation of *L. viridis*(first section; fig.1) and of *L. cingulatus*(second section; fig.2) in the region of the quadrilateral. The hindwing-quadrilateral of *L. viridis* is almost exactly like that of the forewing; the hindwing-quadrilateral of *L. cingulatus* is shaped as in Fig.3. The differences between the two may be stated as follows :—

Lestes(sens.str.).	Austrolestes, n.g.
Type: *Lestes barbara* Fabr.	Type: *Lestes cingulatus* Selys.
Wings rather long for size of insect, and held horizontally in repose.	*Wings* shorter and narrower in comparison with size of insect; completely folded back in repose.
Sectors of arculus arising very near its upper end; and hence	*Sectors of arculus* arising nearer its middle, the lower sector about at the middle; and hence
Quadrilateral relatively *broad*, the width being between one-half and one-third of the long inferior side. Very little difference between quadrilaterals of fore and hindwings.	*Quadrilateral* much narrower, the width being between one-fourth and one-fifth of the long inferior side. Upper side of quadrilateral distinctly longer in hind wing than in fore.†(See Fig.3).
Median and subnodal sectors arising nearer to arculus than nodus, and close together.	*Median and subnodal sectors* arising nearer to arculus than nodus, *very* close together, sometimes from the same point.

† In some species of *Austrolestes* (as in the figured one, *A. cingulatus*) the distal side of the quadrilateral is produced *straight* to the margin of the wing; this is not, however, a constant for the genus.

The above subdivision of the genus *Lestes* emphasises certain points of phylogenetic interest, viz.:—

1. *Austrolestes* must be regarded as a more advanced type than *Lestes*(s.str.), the reasons for this being :—

a. Originally, all *Odonata* rested with outspread wings, and this custom prevailed also amongst the ancestors of our present-day *Zygoptera*. Gradually, however, as the asthenogenetic development of this group proceeded, it became more and more advantageous to them to be able to hide away without attracting notice; so that we find *nearly all* present-day *Zygoptera* adopting this plan. The chief exceptions seem to be the rock-dwellers on fast mountain-streams (*e.g.*, *Diphlebia*, *Argiolestes*), which, having no particular hiding-places, have continued the habit of resting with outspread wings, and have developed considerable alertness of movement (on the lines of the *Gomphinæ*) from the position of rest. The fact that *Lestes*(s.str.) has not developed the habit of resting with folded wings, in spite of its obvious advantage to them, seems to be a strong argument for my statement.

b. The sectors of the arculus arise lower down in *Austrolestes* than in *Lestes*(s.str.). This is a sign of greater specialisation.

c. Although in both *Lestes*(s.str.) and *Austrolestes*, the inferior sector of the triangle proceeds backwards basally only *as far as* the basal postcostal nervule(compare *Pseudagrion*), yet a careful examination, under a high power, shows nearly always less completeness in this reduction in *Lestes*(s.str.) than in *Austrolestes* (*i.e.*, the sector fuses with the wing-margin just a little beyond the cross-vein towards the wing-base).

d. Austrolestes is more asthenogenetic than *Lestes*(s.str.) in the reduction in width and in area of its wings, compared to the size of the insect itself.

2. The greater asthenogenetic specialisation of *Austrolestes* has enabled it to take a position in the Australian *Odonate* fauna more analogous to that of *Agrion* in Palæarctic regions than to that of *Lestes*(s.str.). It is probably as a consequence of this that the metallic green colouration of the older *Lestes*(s.str.) has given place in *Austrolestes* to a more distinctly bicolorous pattern of

blue and bronze (again, compare *Agrion*). The great majority of the species of *Austrolestes* have developed this blue and bronze pattern to a remarkable degree, the only real exception being *A. cingulatus* itself, in which the metallic green persists; though in *A. aualis* the blue develops very late, and in the tropical species it is usually replaced by grey or bluish-grey.

3. The result of this successful seizure, by *Austrolestes*, of the sphere originally occupied by the Australian members of the legion *Agrion*, has led to further intense asthenogenesis in the latter group. The result is that we find *Agrion* represented in Australia by only one remaining species of that genus, and by a large number of species belonging to the more asthenogenetic genera *Pseudagrion*, *Agriocnemis* and allies.

In connection with the question of colour-patterns, I do not think that we can claim that the metallic green pattern is more archaic than the blue-bronze pattern. Each pattern seems to be due to the formation of a given set of habits in a group. Species that habitually hide away in green foliage seem to develop the metallic green pattern, quite apart from whether they are archaic or highly specialised forms. Take, for instance, *Synlestes* and *Hemiphlebia*. While, on the other hand, species that keep out in the open, and prefer the full glare of the sun, tend to develop blue patterns; *e.g.*, *Austrolestes*, *Agrion*, *Ischnura* and the sun-loving *Austrocnemis splendida*. Herein, I think, lies the sole explanation of the persistence of the metallic green pattern in *Austrolestes cingulatus itself*. This species is subalpine, inhabiting *running streams* on mountains and highlands. It is rather fond of hanging up in the reeds, just like *Synlestes weyersi*. But all the blue-bronze species inhabit either stagnant pools or very slowly running creeks, and may be seen continually flying up and down in the sunshine. In the case of *Austrolestes aualis*, whose favourite haunt is shady swamps, we find the bicolorous pattern existing, but the blue usually replaced by *pink*: though I have noticed that where this species lives in more open localities, as along the banks of slow-running streams, the mature males become nearly as blue as those of *A. leda*.

8. Austrolestes alleni, n.sp.

♂. *Total length*, 37; *abdomen*, 30; *hindwing*, 18 mm.

Wings: *neuration* dark brownish, *pterostigma* 1 mm., brownish; *postnodals* 10-12. Head: *eyes* brown, paler beneath; *epicranium*, *clypeus*, and *labrum* brown, mottled with darker brown in places; *labium* pale brownish. Thorax: *prothorax* pale brown. *Meso-* and *metathorax* olive-brown shading to glaucous-grey on sides; on each side of dorsal ridge a narrow stripe of metallic olive-green, to which is attached, at the middle point of the outer side, a small spot of the same colour. On each side, two small dark brown spots. *Underside* dull whitish. *Legs* brown; tibiæ with long stiff hairs. Abdomen: 1-2 thickened, 3-7 slender, 8-10 slightly wider. *Colour*: 1, pale brown; 2-9, dark olive-brown, sides and underside paler except at sutures; on each side of 2 a pale area; 10, pale brownish. Appendages: *superior* 1 mm., brownish, slender, forcipate, hairy; inner side slightly swollen near base, and carrying a distinct spine low down just beyond half-way; outer surface furnished with several small spines not arranged in a definite row; some long hairs towards tips. *Inferior* very small, blunt, brownish. (Plate xlv., figs. 11-12).

♀. Unknown.

Hab. Cairns, N.Q.; two males only, taken by Mr. E. Allen, in August and September, 1905. Very rare.

Type: ♂ in Coll. Tillyard.

Allied to *A. tenuissimus* Tillyard, and *A. paludosus* Tillyard, by the colour-scheme, the three species forming a well-marked "tropical group" within the genus for this reason. In size and shape, however, it seems closest to *A. psyche* Selys, which it also resembles most closely in the form of its appendages.

I have dedicated this species to its discoverer, Mr. E. Allen, to whom I am indebted for much valuable help in the form of careful collecting of *Odonata* in the Cairns district.

9. Austrolestes insularis, n.sp.

♂. Unique. *Total length*, 37; *abdomen*, 29·7; *hindwing*, 17 mm.

Wings: *neuration* very dark brown; *pterostigma* 1 mm., dark brown, covering exactly one cellule; *postnodals* 9(11 in one

forewing. *Nodal sector* arising only *two* complete cells before nodus. Head: *eyes* dark brown; *epicranium* black, *clypeus* and *labrum* greyish(possibly blue in living insect): labium pale dirty straw-colour. Thorax: *prothorax* blackish. *Meso-* and *metathorax* with a black dorsal stripe bordered on each side by a dark metallic green stripe; next, a humeral pale stripe(probably blue in living insect), then a subhumeral black stripe. Sides pale (possibly bluish) with a straight black lateral stripe; underside pale. *Legs* very pale(possibly bluish) with black stripes. Abdomen very slender, dull blackish, slightly metallic; markings, if any, obliterated; undersides brownish, sutures black. Appendages: *superior* 1·3 mm., forcipate but with extended tips (as in *A. analis*), *pale brown with black bases and tips; inferior spine small*, not visible from above; outer margin with three very small blunt teeth. *Inferior* very short, close together, subtriangular, black(Plate xlv., figs.13, 14).

♀. Unknown.

Hab.—Banks Island, Torres Straits; taken by Mr H. Elgner, February 16th, 1910.

Type: ♂ in Coll. Tillyard.

Closely allied to *A. analis* Rambur, from which it differs by its smaller size, different colouration, and especially by the smallness of the inferior spine on the appendages, and the tips even more pointed than in *A. analis*.

10. Austrolestes tenuissimus Tillyard.

Lestes tenuissimus Tillyard, These Proceedings, 1906, xxxi., p.179.

♂. Appendages (Plate xlv., figs.9-10): *superior* 1·5 mm., black, forcipate, the inner inferior margin carrying a rather blunt spine near base, and a large lobe or shelf about midway; outer surface furnished with 4-5 small spines; tips moderately pointed and slightly bent outwards. In profile, the basal spine is more conspicuous and sharper, and the edge of the projecting shelf shows also a sharp spine. *Inferior* short, blunt and thick.

Hab.—Cairns and Cooktown, N.Q. I took a fair number at Cooktown during January, 1907; some of the males appeared

more bluish in the paler parts than those of the type-series, from Cairns.

Types: ♂♀, Coll. Tillyard(Cairns, N.Q.).

Very distinct from all other species of the genus, but mostly resembling *A. colensonis* White, from New Zealand. From the latter it may be distinguished by its much duller colouration, more slender build, and by the form of the projections on the inner side of the male appendages; *A. colensonis* only possessing a single large tooth about midway.

11. Austrolestes paludosus Tillyard.

Lestes paludosus Tillyard, *loc. cit.*, p.181.

Besides the type ♂ and ♀ described from Townsville, I took a fair series of this rare insect at Cooktown, N.Q., in January, 1907. These were slightly bluer than the types, but did not differ from them otherwise.

♂. Appendages: *superior* 1 mm., forcipate, much thickened, and of the remarkable form found in *Lestes sponsa* from Europe, viz., inner inferior margin much swollen into a huge projecting shelf irregularly serrate along its outer margin; between the shelf and base is a small tooth or spine. Outer margin furnished with five small teeth and some long hairs; tips bluntly rounded and turned inwards. Seen in profile, these appendages are massive, with wide truncated tips. *Inferior* moderately small, bluntly rounded(Plate xlv., figs.7,8).

Types: ♂♀, Coll. Tillyard(Townsville, N.Q.).

Easily distinguished from all other Australian species of the genus by its remarkable appendages. In general build, it most resembles *A. leda* Selys, while, in colouration, it comes nearest to *A. tenuissimus* and *A. alleni*.

12. Austrolestes aridus Tillyard.

Lestes aridus Tillyard, These Proceedings, 1907, xxxii., p.762.

♂. Appendages: *superior* 1·2 mm., forcipate, downy; inner inferior margin carrying a *very large* spine about one-third from tips; outer surface carrying several irregularly placed small spines. *Inferior* fairly prominent, 0·5 mm., subconical (Plate xlv., figs.5-6).

Hab.—Tennant's Creek, Central Australia.

Types: ♂♀, and series of cotypes, Coll. Tillyard(1905-1906).

Closely allied to *A. leda* in size, form and colouration; but at once distinguished from this latter species by the *two end segments of the male being pale blue*; also the inferior spine on the male appendages is much larger in *A. aridus*.

Legion iii. **Lestoidea,** legio nova.

Characters intermediate between those of the legions *Lestes* and *Protoneura*. *Pterostigma an elongate parallelogram,* very slightly convex, (of the form shown in *Lestes* s.str.). Wings narrow, petioled to about the second antenodal. *Inferior sector of triangle absent:* a small cross-vein descending from quadrilateral to margin of wing. Superior sector of triangle short. *Nodal and subnodal sectors arising nearer to arculus than to nodus,* as in *Lestes*. (Plate xlvii., fig. 1.).

Lestoidea, n.g. (Plate xlvii., fig. 1.).

Characters as for the legion given above. Superior appendages of male forcipate, thick.

Type: *Lestoïdea conjuncta*, n.sp.

13. Lestoidea conjuncta, n.sp. (Plate xlvii., fig.1).

♂.Unique. *Total length*, 31; *abdomen*, 25; *hindwing*, 19·5mm.

Wings: *neuration* black: *pterostigma* 1·2 mm., covering two cellules, black: *postnodals* 14 in forewings, 11-13 in hindwings. Colour faded, the insect appearing blackish all over, except the *labrum, labium, prothorax* and sides of *thorax*, which are brown. Head rather large, eyes large. Thorax: *prothorax* short and rather wide: *thorax* short but well built. Abdomen short, 1-2 slightly enlarged, 3-7 slender, 8-10 enlarged again. Appendages: *superior* 0·8 mm., short, thick, forcipate: tips truncate, nearly touching, straight and parallel, slightly enlarged: black, roughly covered all over with very minute spines: interior

side rather hollowed out. Seen in profile, these appendages are thick, truncate, with the tips enlarged downwards into a large squarish head. *Inferior* 0·4 mm., small, thin, slightly curved, black; separated by a large rounded downy tubercle(Plate xlvi., figs.1-2).

Hab.—Kuranda(E. Allen), January, 1908.

Type: ♂, Coll. Tillyard.

This unique and wonderful insect, for the discovery of which we are indebted to the keenness of my friend, Mr. E. Allen, is of the greatest phylogenetic importance, as it supplies the missing link between two very distinct groups or legions of the *Agrionidæ*, both of which have been claimed to be archaic. *Lestoïdea* may be regarded as a form *asthenogenetically intermediate* between the less-reduced *Lestes* and the more reduced *Protoneura*. The three forms do not, however, form links in a single chain of descent; for, in their early stages, the Australian genera of the legion *Protoneura* show a much closer affinity to *Argiolestes* and *Diphlebia* than they do to *Lestes*. The full study of these relationships cannot be entered into here. It will be sufficient to indicate that the evidence, which I have so far accumulated, is strongly in favour of the legion *Protoneura* being the *least* archaic of any of the *Zygoptera*, except the legion *Agrion* itself.

Legion iv. **Protoneura.**

14. Nososticta solida Selys. (Plate xlvii., fig.2).

This beautiful species is widely distributed in Eastern Australia. I have taken it at Kuranda, Atherton, and Cooktown, N. Queensland; on the Bellinger River, N.S.W.; on the Horton River at Pallal, N.S.W.; and also in the Sydney district. M. René Martin records it from Alexandra, Vic. De Selys records it from Adelaide. With so large a range, it is scarcely surprising that considerable variation occurs. The specimens taken inland at Pallal are larger and more robust than the coastal forms. Also there is considerable variation in the length of the superior sector of the triangle, which sometimes traverses a whole cell, and some-

times only a half, beyond the quadrilateral, before reaching the wing-border. The generic definition, as given by de Selys ("ne traversant que la moitié de la cellule marginale qui suit le niveau du quadrilateral"), needs, therefore, to be somewhat amplified with respect to this nervure. Another point which de Selys fails to notice, but which is of the greatest interest as placing this genus considerably apart from all others of the legion, is *the remarkably small amount of petiolation* of the wings. This gives a much greater breadth to the wing between the levels of the arculus and nodus than can be found in other *Protoneuran* genera, and leaves the large cell below the arculus much broader than usual. There are also several very wide cells adjoining the posterior wing-margin, immediately after the termination of the superior sector of the triangle. (Plate xlvii., figs. 2, 2*a*; fig. 2 gives the more robust wing-type from Pallal, while fig. 2*a* indicates the typical form of de Selys).

♂. Appendages: *superior* 0·6 mm., conical, yellow; seen from above, the bases are broad and tips well pointed, and there is a projecting hairy tubercle inwards about one-third from the base; in profile, the bases are narrower, and the undersurface carries a sharp tooth curved inwards towards the base. *Inferior* 0·2 mm., blackish, thick, rounded, with a small cleft near middle. (Plate xlvi., figs. 3, 4.).

Types: ♂, (damaged) ♀, Coll. Hagen; ♂ (complete), Berlin Museum.

Notoneura, n.g.

Notoneura, n.g. (Plate xlvii., fig. 3.).

Basal postcostal nervule situated at about the level of the first antenodal, or slightly after. *Inferior sector* of triangle absent; *superior sector* very short, reaching the wing-margin within the distance of a single cell beyond the quadrilateral. *Median sector* arising before nodal crossvein. *Head* small;

thorax narrow; *legs* short; *abdomen* excessively slender. *Superior appendages* of male subtriangular, *inferior* shorter.

Type: *Alloneura solitaria* Tillyard.

It is necessary to propose this new genus for the reception of the two Australian species, *Alloneura solitaria* Tillyard, and *A. calestina* Tillyard, inasmuch as a careful comparison with de Selys' definition of *Alloneura* (viz., that portion of his "grand-genre" *Alloneura*, which he designated as "Sous-genre" *Alloneura*) shows us that the two groups are evidently not congeneric. The two species mentioned are most closely related to *Nososticta*, and might be included in that genus, were it not for important differences in build and venation. These are: the very small head and narrow thorax, short legs and excessively attenuated abdomen, which alone distinguish these two species sufficiently from *Nososticta;* and, in venation, the slenderer build of the wing, with slightly more petiolation, and a much smaller number of transverse veins between nodus and pterostigma. In Plate xlvii., fig. 3, I have figured the hindwing of a specimen of *A. solitaria* from Cooktown, possessing *only two* transverse veins between nodus and postnodal sector. I have several other specimens like this, illustrating the greatest amount of reduction known to me in this wing-area for the legion *Protoneura;* but the greater number of specimens have *three* transverse veins in the space mentioned.

15. Notoneura solitaria Tillyard.

Alloneura solitaris Tillyard, these Proceedings, 1906, p. 182 (*solitaris* being a *lapsus calami* for *solitaria*).

♂. Appendages: *superior* 0·5 mm., black, conical, *depressed;* tips very sharply pointed: *inferior* 0·2 mm., very blunt, with an inferior upcurved hook at base, black. (Plate xlvi., figs. 5, 6.).

Hab.—Cairns, Kuranda, and Cooktown, N.Q.

Types: ♂ ♀, Coll. Tillyard, Kuranda: December, 1904.

16. Notoneura cœlestina Tillyard.

Alloneura cœlestina Tillyard, *loc. cit.*

♂. Appendages: *superior* 0·4 mm., bright blue, appearing rather bluntly subconical from above, but, in profile, distinctly truncate, thick, and even slightly hollowed out: *inferior* nearly as long, black, with a conspicuous inferior upturned hook. (Plate xlvi., figs. 7, 8.).

Hab.—Cairns and Cooktown, N.Q.

Types: ♂♀, Coll. Tillyard; Cairns, January, 1905.

For the venation of this genus, see Plate xlvii., fig. 3 (*N. solitaria*).

17. Isosticta simplex Martin.

This species has been well described by René Martin in his "Odonates du Continent Australien" (Mém. Soc. Zool. de France, 1901), p. 244, but the appendages of the male are not figured. As these are very remarkable, I have figured them, both from above and in profile (Plate xlvi., figs. 9, 10.). De Selys constituted the genus *Isosticta* on the species *I. spinipes* from New Caledonia, of which he possessed only a single male *lacking the whole of the abdomen except segments* 1-2. It may, however, be fairly assumed that this species, so closely allied to *I. simplex* in other respects, possessed also appendages of a similar remarkable form; especially as, in the new species described below, a similar form of appendage is found. Apart, therefore, from the venation, which distinguishes this genus from both *Alloneura* and *Austrosticta*, its closest allies, we may fairly consider the form of the male appendages to be a generic character, which may be stated as follows: "Both superior and inferior appendages of male somewhat forcipate, the inferior pair prolonged beyond the superior." The only other genus which possesses appendages approaching this form, is *Austrosticta*, which we may, therefore, regard as a closer ally to *Isosticta* even than *Alloneura* itself is.

Besides the locality where Martin's types of this species were taken (Alexandra, Vic.), I have found it in widely separated localities, but it is never very common. It occurs at several places near Sydney, viz., Duck Creek, Auburn; National Park and Lily Vale; Ourimbah; also at Atherton, in North Queensland. It begins to appear just before the New Year, and is most likely to be met with during February and March. It is a most retiring insect, being very fond of resting on small shrubs, usually on some of the more central twigs or branches. At intervals, it indulges in short flights, which usually consist in balancing itself in the air in one position, often in a confined space between the branches of its shelter. When disturbed, it does not fly away, but flits further into the bush, and settles in the foliage.

18. Isosticta banksi, n.sp. (Plate xlvii., fig. 4).

♂. *Total length*, 44; *abdomen*, 36·5; *hindwing*, 22·5 mm.

Wings hyaline: *postnodals* 13-15 on fore, 12-13 on hindwing; *pterostigma* brownish, 1 mm. along costa, but with upper distal angle very acute, so that the lower side is very short, and covers only one cellule. (Plate xlvii., fig. 4.). Head: *epicranium* dull black, *clypeus* shining black, *labrum* shining black, bordered along mouth with a pale straw-coloured band; *labium* deeply cleft, pale straw colour. Thorax: *prothorax* blackish, powdered with grey. *Meso-* and *metathorax* long and narrow, metallic greenish-black above, with a jet-black dorsal line; sides shining black, edged and touched here and there with grey pruinescence. In more mature males, the whole thorax is slightly pruinescent, and a pair of strongly pruinescent grey humeral bands appear. Legs short, pale brown, with black stripes above on femora and tibiæ. Abdomen long and slender, very cylindrical, 1-2 scarcely enlarged at all, 7-10 very slightly so. Colour dark metallic green, 1-2 with grey pruinescence above; 7-10 duller than the rest; 3-6 with a tiny pale mark on each side close up to base. Appendages: *superior* 0·6 mm., black, forcipate, bases thick; seen from above, the tips are rounded, and there is

a small tubercle on inner margin near them; in profile, they are truncate and somewhat clubbed, with an upper projection one-fourth of the way from the tips. *Inferior* 1 mm., *slightly* forcipate, slenderer when seen from above, but, in profile, somewhat thicker and slightly clubbed: tips rounded. (Plate xlvi., figs.11,12).

♀. *Total length*, 42; *abdomen*, 34; *hindwing* 25 mm.

It differs from the male as follows:—*pterostigma* 1·3 mm., paler. *Abdomen* narrowest at base, gradually enlarging to 7, 8-9 very swollen, 10 short and narrow: 1, pruinescent, 2-6, dark metallic greenish-bronze; 7, very slightly pruinescent; 8, covered with whitish pruinescence; 9, slightly pruinescent; 10, black. *Appendages* 0·2 mm., black, straight, somewhat pointed. *Ovipositor* projecting well beyond end of appendages.

Hab. – Banks Island, Torres Straits. Four males and five females, taken by Mr. H. Elgner, in February, 1910.

Types: ♂♀, Coll. Tillyard.

This fine species differs from *I. simplex* Martin, in its greater size, metallic colouration, and in the much longer and thicker appendages of the male. The superior appendages of *I. simplex* ♂ are very much depressed, and have rounded tips, while those of *I. banksi* ♂ stand out straight, and are truncate in profile.

19. Austrosticta fieldi Tillyard (Plate xlvii., fig.5).

These Proceedings, 1907, xxxii., p.765, also Plate xlii., figs. 2 and 6-9.

The figures of appendages in my former paper are too small to give the details accurately. I now give much enlarged drawings of the male appendages (Plate xlvi., figs. 13, 14.). It is necessary also to amend slightly the generic description of *Austrosticta* (*loc. cit.* p. 764), since the superior appendages, though appearing straight when examining the insect, are not really so, though they cannot be called

forcipate. I, therefore, amend this part of the definition as follows:—*Superior* appendages of male not forcipate, but tkick and only slightly curved; *inferior* forcipate and projecting well beyond them.

♂. Appendages of *A. fieldi*: *superior* 0·8 mm., pale straw-colour, very thick, slightly curved, tips broad and rounded, an inner projecting tubercle about two-thirds from the base. *Inferior* 1·3 mm., slender at tips, but with broad thick bases; forcipate, tips clubbed and rounded; pale straw-colour. Seen in profile, the *superior* appendages are very thick, depressed; the inferior very stout for their first three-fifths, then slender and somewhat upcurved.

Hab.—Tennants's Creek, Northern Territory; two males and one damaged female taken by Mr. J. F. Field, in April, 1906. Very rare.

Types: Coll. Tillyard.

NEOSTICTA, n.g. (Plate xlvii., fig. 6).

Basal postcostal nervule situated between the levels of the two antenodals, but closer to the first than to the second. *Wings* petioled to just beyond the level of the arculus. *Inferior sector* of triangle absent; *superior sector* terminating several cells beyond the level of the nodus. *Median sector* arising just before the nodal cross-vein. *Abdomen* slender; *superior appendages* of male thick, *inferior* much shorter. Type, *Neosticta canescens*, n.sp.

Allied to both *Isosticta* and *Austrosticta*, but easily distinguished from both by the form of the male appendages, and by the much greater length of the superior sector of the triangle.

20. NEOSTICTA CANESCENS,* n.sp. (Plate xlvii., fig. 6).

♂. *Total length*, 38; *abdomen*, 31; *hindwing*, 19 mm.

* I regret that specimens of this insect have been sent out under other MS. names, to which names there are objections. Will recipients please note?

Wings: *neuration* black; *postnodals* 12-13 in fore, 10-11 in hindwing; *pterostigma* 1 mm., dark brown with upper distal angle very acute; lower side covering only half a cellule. *Superior sector of triangle* forming 5-6 cells before reaching wing-margin. Head: *eyes* black above, yellowish-green beneath and in front next clypeus. *Epicranium* and *clypeus* black, separated by a pale suture; *labrum* black bordered with pale brown; *labium* pale dirty whitish. Thorax: *prothorax* black, with a brown dorsal stripe. *Meso-* and *metathorax* black above; a pair of short brown humeral stripes, 2 mm. long, not reaching as far as the wing-bases; a pair of narrower pale yellow lines arising just under fore-wings, and running to a point just under the humeral stripes; on each side, below these, a broad band of the black ground-colour; rest of side and underside pale yellowish. More mature specimens show signs of becoming pruinescent-grey. *Legs* short, black above, pale beneath. Abdomen very slender, 1-2 and 8-10 slightly thickened. Colour dull black; 1-2 with a fine pale yellow dorsal line, and low down on each side a broad lateral band of the same colour, interrupted by suture; 3-7, a very narrow transverse basal band of pale yellow, close up to suture; 8-10, black, powdered with greyish bloom in the mature insect, sides with large dull yellow marks or spots. Appendages: *superior* 0·8 mm., forcipate, thick, strongly clubbed, tips squarish; inner margin hollowed out near middle, and carrying a set of small spines on the curved margin near base; in profile, these appendages appear fairly straight and pointed; colour black, with short grey hairs. *Inferior* 0·2 mm., bluntly pointed; in profile, subtriangular (Plate xlvi., figs.15, 16).

♀. *Total length*, 37; *abdomen*, 30; *hindwing*, 22 mm. Very similar to male, from which it differs as follows: *abdomen* thicker and more cylindrical, 8-10 much clubbed; sides of 1-7 with a longitudinal dull yellowish band, interrupted by a small black piece at apical end of each segment; 8 with yellow lateral spots, and some yellow on ovipositor; 9, large

yellowish lateral spots; 10, very short, with small lateral spots. *Appendages* 0·2 mm., conical, wide apart, black. *Ovipositor* with the keel very minutely toothed, ending in a pair of rather thick single-jointed downy filaments.

Hab.—Heathcote, Illawarra Line, N.S.W., November-December.

Types: ♂♀, Coll. Tillyard; Heathcote, Nov., 1907.

This rare insect resembles *Isosticta simplex*, at first sight, so exactly in habits and colouration, that I have no doubt that it will often be overlooked, as it was at first by myself, by collectors familiar with the commoner species. Having previously taken *I. simplex* fairly commonly, both at National Park and Lily Vale, but never earlier than January, I was much surprised at encountering an insect so similar, and in a locality so close, at the beginning of November; and I thought at first that *I. simplex* must be double-brooded. However, on capturing one, I noticed the remarkable difference both in venation and appendages. Along the banks of the Woronora River and Heathcote Creek, these insects are fairly abundant, and are very fond of hiding in overhanging bushes, or indulging in short poising flights in the confined spaces between the branches. The males, however, also fly fairly quickly along short reedy stretches of the creek-banks, and I think we may claim this insect to be more active and of stronger flight than *I. simplex*. This is mainly due, not to any superiority in the wing, but rather to the shorter abdomen, which gives the insect a better balance when flying.

Race *dorrigoensis*.—On the Little Murray River, near Dorrigo, N.S.W., I met with this insect again, in November, 1911, and secured two males, for comparison. I was much surprised to notice the great difference in size and colouration between these and my type-series. *Total length*, 43 mm., *hindwing*, 25 mm. *Superior appendages* considerably larger, but of same form. Segments 8-10 strongly powdered

with greyish-white pruinescence; 1-2 slightly pruinescent. One specimen has epicranium, prothorax, and upper surface of thorax pruinescent.

These insects were flying quite strongly along the reedy edges of the river, and were not easy to capture, considering their size and build. I think that this more active and sun-loving habit may explain the greater pruinescence, and also, perhaps, the finer development of this race, which is analogous to the race *amabilis* of *Argiolestes icteromelas*, from the same locality.

ORISTICTA, n.g. (Plate xlvii., fig. 7).

Basal posticostal nervule situated between the levels of the two antenodals, but closer to the first than to the second. *Wings* petioled to level of arculus. *Inferior sector of triangle* absent; *superior sector* terminating at level of nodus, forming only one cell beyond quadrilateral. *Median sector* arising *after* the nodal cross-vein. *Pterostigma* very short, of irregular quadrilateral shape. *Abdomen* slender, elongated. *Superior appendages* of male thick, clubbed, *inferior* about half as long. Type, *Oristicta filicicola*, n.sp.

Distinct from all the preceding genera by the peculiar position of the median sector, also by the peculiar form of the pterostigma. It resembles *Isosticta* and *Nososticta* in the shortness of the superior sector of the triangle, and further resembles *Isosticta* in its elongated and slender abdomen.

20 *bis*. ORISTICTA FILICICOLA, n.sp. (Plate xlvii., fig. 7).

♂. *Total length*, 41·5; *abdomen*, 34·5; *hindwing*, 21·5 *mm*.

Wings: *neuration* fine, black; *pterostigma* 0·7 mm., dark grey edged with black, surmounting a little more than half a cell. *Postnodals* 12-14 in fore, 11-13 in hindwing. Head narrow and small; *eyes* very dark brown; *epicranium*, *clypeus*, and *labrum* black, with pale brown sutures; *labium* pale brownish. Thorax: *prothorax* pale brown,

with a large squarish black spot at base. *Meso-* and *metathorax* olive-brown, with a thick straight dorsal black band, carrying on the central ridge a thin white line, very conspicuous; on each side a shorter pale narrow band, edged above with black; sides and underside pale greyish-brown. *Legs* very short, pale brown. Abdomen long and slender; 1-2 scarcely enlarged at all, 1-7 very narrow, 8-10 slightly enlarged. *Colour* metallic steely black, crossed at each suture by a pale creamy line, interrupted dorsally by a black line; sides of 2 pale brown, sometimes also a brownish cloud on dorsal surface of 2; underside pale yellowish-brown, with a dark patch at apex of each segment. Appendages: *superior* 0·5 mm., thick, black, forcipate; seen from above, the inner margin carries a large serrated shelf beginning about the middle and ending on the turned-in edge of the tip, which is somewhat rounded; in profile, the underside is hollowed out into an arch, and the end is strongly clubbed. *Inferior* 0·3 mm., thick, slightly bent, truncate; in profile, the base is thick, the tip narrower but blunt (Plate xlvi., figs. 17, 18).

♀. *Total length*, 37·5; *abdomen*, 31; *hindwing*, 22·5 mm. Very similar to male but differing in the following points. *Labrum* pale brownish. *Abdomen* cylindrical, slightly wider than in male, 8-9 slightly enlarged, 10 very small. Underside of 9 pale yellowish: *ovipositor* black, with two small diverging filaments. *Appendages* very short, pointed, black.

Hab.—Cooktown, N.Q. Very rare; January, 1908.

Types: ♂♀, Coll. Tillyard.

This retiring and inconspicuous species was discovered by me not far from the summit of Mt. Cook. At the top of a very steep gully, densely clothed in forest-growth, a small stream emerges and falls over a steep ledge of rock. At this point the walls of the gully are closed in, so as to form a ledge about twelve feet high on each side of the waterfall.

The whole of the rock is densely covered with ferns. Resting on these ferns, deep in shade, and drenched with the spray of the fall, I found this little dragonfly. I netted one or two after disturbing them, but most of the specimens were just picked up by the fingers. They were very inert, but, as it was a very rainy day, they probably are not always so. Altogether, I took about fifteen males and two females. The locality was, to my mind, very much like that in which, later on, I discovered *Argiolestes fontanus* at Dorrigo, N.S.W. I think that these tiny waterfalls, in dense tropical forest or scrub, are the rendezvous of several rare and retiring species. At midday, the almost vertical sun lights up the little open space in front of the fall, and here, doubtless, these dragonflies collect to disport themselves, and to find their mates, retiring to rest on the fern fronds when the sky is overcast.

General Note on the Australian Species of the Legion Protoneura.—De Selys knew of only one Australian species of this legion, viz., *Nososticta solida* (1860). Over forty years elapsed before another was added, *Isosticta simplex*, by Martin (1901). From 1905 to the present time, I have been fortunate to discover no less than six more; but even now, these eight form a very small proportion of the number described altogether, which is, I believe, more than a hundred. Apart from the Australian representatives, the group appears to be a tropical one, extending throughout the Torrid Zone; so that we may consider the Australian portion to be a tropical invasion from the region of New Guinea and the Torres Straits Islands, the invaders having probably themselves been descended from an older stock inhabiting Ceylon, Java, and the Celebes, which gradually worked eastwards. We have strong evidence for this theory in a comparison of the Australian forms with the Indo-Malayan

ones. From such a comparison, we find at once that the Australian forms are *more reduced* than the Indo-Malayan, particularly *in the complete loss of the inferior sector of the triangle*, in the great reduction in length of the superior sector, in the small head and narrow abdomen, and in the small size of the legs. Take, for example, the species of the genus *Alloneura*, described by de Selys in 1860. These are divided into three groups, according to the length of the superior sector of the triangle, which is greatest in those species occurring in India, slightly less in the Ceylon species, and considerably less in the Malayan species. In the last group, moreover, we find de Selys making three subgroups, indicating three stages in the reduction of the inferior sector, which is present in *A. analis* Selys, from Mount Ophir, also present, but smaller, in several Singapore and Bornean species, and finally absent in the Bornean species *A. dorsalis* Selys. We see, therefore, a progressive reduction in both the superior and inferior sectors, as we pass from the western to the eastern limit of this genus. It is, I think, evident that the legion *Protoneura* is not, strictly speaking, an archaic group as it now stands, but an exceedingly asthenogenetic group, derived from ancestors that were possibly archaic in comparison with the immediate ancestors of such forms as *Agrion*. Indeed, we may say that it was the failure of the *Protoneuran* ancestors to specialise in the way that *Lestes* and *Agrion* did, that left them behind in the struggle, and gave them the choice either of complete extermination or of saving themselves by adopting a strongly asthenogenetic line of development. It was after this development had set in that this group was able to extend its borders, and began to appear in Borneo, New Guinea, and finally in Australia, where, by continuous asthenogenesis, it was able not only to hold its own, but to gain a small footing, even in the more temperate part of the Continent.

TABLE OF THE AUSTRALIAN GENERA OF THE LEGION *PROTONEURA*.

(N.B.—*Inferior sector of triangle* absent in all.)

Genus.	Type.	Neuration.			Appendages of Male.		General Remarks.
		Basal post-costal nervule	Superior sector of triangle	Median sector arising	Superior	inferior	
Nososticta Selys	*N. solida* Selys	*at* or *slightly before* level of first antenodal	ending at *one* cellule only, or part of one, beyond quadrilateral	*before* nodal cross-vein	subtriangular	shorter	robust build
Notoneura, n.g.....	*Alloneura solitaria* Tillyard.	*at* or *slightly after* level of first antenodal	ending at *half* or *less than half* a complete cellule beyond	*before* nodal cross-vein	subtriangular	shorter	excessively slender build
Isosticta Selys	*I. spinipes* Selys (imperfect) [*I. simplex* Martin]	*before* level of first antenodal	ending at from *one* to *two* cellules beyond	*at* nodal cross-vein	forcipate	longer, forcipate	long and slender abdomen
Austrosticta Tillyard..	*A. fieldi* Tillyard.	*between* antenodals, slightly nearer to first	ending at from *three* to *four* cellules beyond	*before* nodal cross-vein	thick, subconical	longer, forcipate	robust build
Neosticta, n.g.	*N. canescens*, n.sp.	*between* antenodals, but nearer to first	ending at from *five* to *seven* cellules beyond	*just before* nodal cross-vein	thick, forcipate	shorter	slender build
Oristicta, n.g.	*O. filicicola*, n.sp.	*between* antenodals, but nearer to first	ending at *about one* cellule beyond	*well after* nodal cross-vein	thick, forcipate	shorter	long and slender abdomen

Note.—The form of the pterostigma, not included in this table, can best be seen by reference to the Plate.

Legion v. **Agrion.**

In this legion, we find an exceedingly uniform type of venation, which may certainly be claimed as the most highly specialised in the family. The general result of this line of development has been similar, both in its signal success, and in the type of insect produced, to the more archaic *Lestes*. By the strengthening of the quadrilateral, which assumed, as in Lestes, an irregular form, by the early fixation of the second antenodal at the level of the arculus, and by the stability in position of the median sector, the legional type became a great success without either having to sacrifice the value of the sectors of the triangle as parts of the wing-scheme or being in any way driven to extremes of petiolation. Though a distinct advance on the *Lestes* wing-form, yet this *Agrion*-type of wing must be of considerable antiquity, and I regard those members of the legion which show most aberration from that type, not as archaic remnants of a still older wing-type, but rather as the result of further asthenogenesis brought about by special conditions. For instance, the genus *Agriocnemis* is not to be regarded as more archaic than the type-forms, merely because its quadrilateral is more regular and the position of the second antenodal not in line with the arculus: but rather, these must be considered as the inevitable effects of asthenogenetic reduction beyond the type-stage. Proceeding even further along the same lines, we come to the remarkable genus *Hemiphlebia*, in which the asthenogenesis is so complete that, in the forewing, the cross-vein forming the lower half of the arculus, *i.e.*, the basal side of the quadrilateral, has been entirely dispensed with, and the vein M_4 thereby considerably strengthened and straightened out. This may be fairly claimed as the most advanced asthenogenetic type of *Odonate* wing yet developed. [In this connection it is interesting to note that, in the female of *Hemiphlebia*, this cross-vein is still occasionally present in the forewing, indicating how very recently this asthenogenetic development began].

Owing to the uniform venation of this legion, it is difficult to choose suitable venational generic characters. If, however, we study the various stages of the asthenogenetic process that are still evident, we may obtain reliable criteria for the subdivision

of the legion. When these fail, recourse must be had to non-venational characters, but it is advisable to use unisexual characters as little as possible. It is a great pity that de Selys divided his "grand-genre" *Agrion* into two main divisions depending purely on a single female character (the presence or absence of a spine at the end of segment 8, underneath); for there are, and probably always will be, a large number of rare species whose females are not known, that must remain *incertæ sedis* in such a classification. I, therefore, propose that, for generic subdivision in this legion, the following order of preference should be observed:—(1)Constant venational difference. (2)Constant bisexual characters, not venational. (3)Constant unisexual characters, only to be used when (1) and (2) fail, and precedence to be given to unisexual *male* characters, owing to the comparative rarity of the females.

I now propose to study these in detail, in order to obtain a satisfactory classification at least of the Australian species of the legion.

i. *Venational differences.*—The following are of value for generic subdivision:—*a. The amount of petiolation of the wing. b. The form and length of the inferior sector of the triangle.*

Taking *a* and *b* together, they form a most valuable character for subdivision. Those forms are the least asthenogenetic in which the basal postcostal nervule is closest to the base of the wing, the petiolation consequently least marked, and the inferior sector of the triangle longest and best developed. Such forms, while marking the "high-water mark" of successful cænogenetic specialisation in the legion, must nevertheless be considered to be more in line with the ancestral stem of the group than are their asthenogenetic offshoots. We may indicate four main stages of development of the combined characters *a* and *b*, as follows:—

(i.) *Argia* and allies (not Australian). Wings very slightly petioled, *the petiolation ceasing well before the basal postcostal nervule;* inferior sector of triangle reaching back basally just beyond this nervule to the point at which petiolation ceases.

(ii.) *Agrion*, *Ischnura* and their allies. Wings a little more petioled (to about level of first antenodal or beyond it); inferior

sector of triangle reaching back basally to slightly beyond the basal postcostal nervule.

(iii.) *Pseudagrion*, *Ceriagrion* and allies. Wings still more petioled, usually to about half-way between the two antenodals; inferior sector of triangle reaching back basally only just to the base of the basal postcostal nervule.

(iv.) *Telebasis* and allies. Wings most petioled of all, the basal postcostal nervule being closer to second antenodal than to first, and the inferior sector of triangle reaching back *not so far as*, or *only just up to* the base of the basal postcostal nervule.

These four groups are roughly of coordinate value, and, subject to a careful study of other characters, form an excellent basis for the subdivision of the legion. It will be noticed that (i.) and (iv.) agree with de Selys' classification, but (ii.) and (iii.) do not.* De Selys unfortunately elevated a unisexual character (the presence or absence of the spine on the end of segment 8 in the female, underneath) into a position of first-rate importance, and thus obscured the obvious affinities between such genera as *Agrion* and *Ischnura*, for instance.

c. The form of the quadrilateral.— This is a useful check to apply to our classification. In the least asthenogenetic forms, the quadrilateral will be found to be most sharply pointed distally (compare the *Lestes* quadrilateral), and very often this development is especially marked in the forewing as compared with the hind. In the asthenogenetic offshoots, the tendency is towards a return to the normal quadrilateral, *e.g.*, in *Agriocnemis*.

d. The position of the median sector.—In those forms where this vein approaches very nearly to the nodal cross-vein, we have a valuable generic character, and one that is evidence of asthenogenesis.

e. The position of the second antenodal.—In the less reduced forms, this will be found usually to be in line with the arculus. Originally it was, no doubt, variable in position, but attained its

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* Selys divided the legion into *three* main groups, *Argia*, *Agrion* (containing ii. and iii.) and *Telebasis*.

position of equilibrium with the highest development of the group. In the asthenogenetic offshoots, we find it again shifted back away from the arculus towards the base.

f. The form of the pterostigma. – Regularity of pterostigma characterises the older forms. As the group reaches its highest point of development, convex, trapezoidal, and even abnormal forms occur, and, in the genera *Ischnura* and *Agriocnemis*, we find a differentiation in the colouration of the pterostigma in fore and hindwings.

Apart from venation-characters, let us now consider:—

ii. *Constant bisexual characters.*—The most important are:—

a. General build or facies. – Reduction in size of head, strength of thorax, size of legs, loss of inferior tooth on the tarsal claw, and extreme attenuation of abdomen, are all parts of the general asthenogenetic process. The four main divisions, suggested by *a* and *b* of the venational characters, will be found to coincide almost exactly with divisions made on character of facies. *Argia* and allies are the most robust insects, possessing also the longest legs; next to these, come *Agrion* and *Ischnura*; then the insects of distinctly slenderer build comprised in *Pseudagrion* and allies; and finally the extremely slender *Telebasis* group (excluding *Agriocnemis*) with the inferior tooth of the tarsal claw absent.

b. Correlated secondary sexual characters.—In this legion, the primitive forcipate form of the appendages of the male has long been lost, and we find an immense variety in the form of these organs. They are usually very short and irregular in form, and would be absolutely useless as *claspers* to hold the female, were it not that there is a correlated development of the female prothorax, whose sculpture is so arranged that the appendages of the male fit closely into it and are held tightly by it. Deep holes and pits, elevated tubercles, horns and hooks on the prothorax all play their part in this group as correlations of particular forms of appendages in the males. It is, therefore, an incorrect use of characters to employ one of these without the other for generic purposes, as de Selys has done, for instance, in *Pseudagrion* and allies. The two must be used together.

c. Outstanding features of colour-development.—I doubt very much if these can ever be used with advantage for generic purposes. The brilliant postocular spots that are developed in many of these species are a case in point. Not only in dried specimens, but also in very immature or very old specimens freshly caught (especially in those specimens where pruinescence supervenes with age and obliterates the colour-pattern), this particular character is exceedingly unreliable. Again, genera based purely on differences of colour are strongly to be objected to; for instance, *Pyrrhosoma* and *Erythromma*, and even *Nehallenia* and *Agrion* (in which similarity or difference in the colouration of the sexes is the distinguishing character) seem to me to be purely artificial genera, and ought not to be admitted. One might as well elevate *Ischnura aurora* Brauer, into a separate genus on account of its red colouration.

iii. *Constant unisexual characters.*—If these must be used at all, one would prefer some *male* character, since, in all collections, the males are so much more numerous than females, and many rare species are represented only by males. One of the chief characters used by de Selys, is the presence or absence of the ventral apical spine on segment 8 of the female, I doubt if this is of as great importance phylogenetically as de Selys imagined; and as it does not appear to be correlated with any male character, the objection to its use is obvious. I should prefer to use it only when all other tests have been exhausted.

I believe that, on the above lines, a good working classification of this legion could be obtained. But I do not propose to attempt it here, as it would be necessary to study every known species *from an asthenogenetic view-point*, in order to succeed. However, I offer a classification of the Australian species of the legion, based on these lines, as follows :—

Inferior sector of triangle reaching back basally to *beyond* the basal postnodal nervule.....	1.
Inferior sector of triangle reaching back basally *only at the most as far as* the basal postnodal nervule*...	2.

* Except in the forewings of *Xanthocnemis*, n.g., in which it reaches *just beyond*. This genus is really the link between 1 and 2, but is most conveniently placed in 2.

1 { Wings slightly petiolate; robust species with long legs furnished with long bristles..... Group i. *Argia*.
  { Wings more petioled; species of median robustness and small species, with short legs and small cilia or bristles .... Group ii. *Agrion*.

2 { Species of *fairly* slender build; median sector arising *well before* nodal vein..... ..... Group iii. *Pseudagrion*.
  { Species of *very* slender build; median sector arising *very close up to* nodal vein..... Group iv. *Telebasis*.

Group i. Argia.

Absent from Australia.

Group ii. Agrion.

1 { Quadrilateral of forewing incomplete, with basal side absent.. .... *Hemiphlebia*.
  { Quadrilateral of forewing normal .... 1.

1 { Quadrilateral of forewing with very acute distal angle (upper side *less than half* of lower)..... 2.
  { Quadrilateral of forewing with less acute distal angle (upper side *one-half or more than one-half* of lower) . ... 3.

2 { Very small insects with long legs and very narrow wings. *Dimorphic females*..... *Austrocnemis*.
  { Medium-sized insects with short legs .... 4.

3 { Very small insects with open venation (few postnodals. *Dimorphic females*..... . .. . *Agriocnemis*.
  { Medium-sized insects with closer venation (more postnodals). . ... *Argiocnemis*.

4 { Pterostigma of all wings unicolorous, female *without* spine under segment 8. .. .. *Agrion*.
  { Pterostigma of forewing bicolorous; female *with* spine under segment 8. *Dimorphic females* ..... *Ischnura*.

Group iii. Pseudagrion.

1 { Basal postcostal nervule close up to level of first antenodal .... 1.
  { Basal postcostal nervule about midway between levels of the two antenodals. . ... 2.

1 { Large species; superior appendages of male pointed; prothorax of female with two hooks pointing forward; blue colouration .... *Caliagrion*, n.g.
  { Medium species; superior appendages of male blunt; prothorax of female simple; red colouration .... *Xanthagrion*.

2 { Inferior sector of triangle of *forewings* reaching *just beyond* basal postcostal nervule; inferior appendages of male much longer than superiors. *Xanthocnemis*, n.g.
Inferior sector of triangle of forewings normal; inferior appendages of male either shorter, or very little longer, than superiors ..... 3.

3 { Superior appendages of male forked or hollowed at tips;* prothorax of female with two hooks pointing forward ..... *Pseudagrion.*
Superior appendages of male not forked or hollowed; prothorax of female simple ..... 4.

4 { Superior appendages of male longer than inferior; small species of blue and bronze colour ..... *Austroagrion.*
Superior appendages of male slightly shorter than inferior; medium species of red colour ..... *Ceriagrion.*

Group iv. TELEBASIS.

{ Inferior sector of triangle reaching the basal postcostal nervule ..... 1.
Inferior sector of triangle *not* reaching the basal postcostal nervule ..... *Telebasis.*

{ Inferior tooth of tarsal claw present but very small; female with a ventral apical spine on segment 8 ..... *Aciagrion.*
Inferior tooth of tarsal claw absent; female without spine on segment 8 ..... *Stenobasis.*

Xanthocnemis connects Group iii. with Group ii. *Aciagrion* connects Group iv. with Group iii. In Group ii., the last four genera may be regarded as a strongly asthenogenetic branch of the main stem, connected to *Agrion* and *Ischnura* viâ *Prosagrion.*

21. AGRION LYELLI, n.sp.(Plate xlix., figs.1, 2, 20).

♂.*Total length* 29, *abdomen* 23, *hindwing* 16 mm.

Wings: *neuration* fine, black; *pterostigma* 0·5 mm., black, rhomboidal; *postnodals* 10-12 on fore, 8-10 on hindwing. Head: *eyes* dark violet above shading to pale blue beneath; *epicranium* black, a transverse pale blue line in front reaching on to the eyes; *postocular spots* deep rich blue, connected by a fine blue line; *postclypeus* black, *anteclypeus* and *labrum* pale blue, *labium*

* Except in *Ps. ignifer* Tillyard, which is retained in this genus on its venational and other characters.

pale dirty brownish, front hairy. Thorax: *prothorax* black, with a fine blue line behind. *Meso-* and *metathorax* jet black above; a pair of beautiful blue antehumeral stripes, followed by a narrower band of black on each side; rest of sides rich blue, with a touch of black in sutures; underside greyish-blue. *Legs* dull blackish, femora pale greyish underneath. Abdomen slender, 1-2 and 7-10 very slightly wider than rest. *Colour* rich blue marked as follows: 1, black lines in sutures; 2, a black L-shaped mark on each side (very variable); 3, a narrow black basal band, and apical one-fourth black; 4-5, apical one-fourth black; 6, all black; 7, basal and apical quarters black, middle part blue; 8, a pair of small black apical spots, often just touching dorsally; 10, blue with a fine black border. *Underside* pale greyish-blue, sutures blackish. Appendages: *superior* 0·3 mm., divergent, black, blunt with a tiny hooked tip on outside edge; seen in profile, they are thick, truncate, with the hooked tip projecting from above. *Inferior* very short, close together, rather rounded, pale dirty brownish (Plate xlviii., figs.1, 2).

♀.Differs from ♂ as follows. Frontal parts of head pale greenish-grey instead of blue (postocular spots blue as in ♂). *Abdomen* stouter, more cylindrical; 1, blue; 2, with large black dorsal cup-shaped mark; 3-5, black above, blue on sides, the black pattern being in the form of an elongated cup with slender stem and broad base; 6, black, an incomplete blue line in each suture; 7-8, black; 9, black, with a triangular or tripod-shaped dorsal blue patch; 10, very short, blue, *Appendages* very short, wide apart, bluntly pointed, black.

Hab.—Gisborne, Vic., and Cressy, Tasmania. December to January, 1908-1909.

Types: ♂♀, and series of cotypes in my collection.

This very beautiful and conspicuous species was first discovered by me during a visit to my friend, Mr. Lyell, at Gisborne, Vic., in December, 1908. It was flying in company with *Austroagrion cyane* Selys, on a small water-lily pond near Mount Macedon. Shortly afterwards, on crossing to Tasmania, I found it more abundantly on the lagoons at Cressy. It is a most interesting discovery, for, (excepting the doubtful *Agrion punctum* Selys,

from Natal), it is the first record of a true *Agrion* from the Southern Temperate Zone.

22. Ischnura heterosticta Burm.

This common species is variable, both in size and colouration. The type-form is that of the mainland, from Melbourne to Sydney; further north to Brisbane, the species becomes slightly smaller but scarcely differs in markings. In Tasmania, this species is common, and appears to reach its highest development in a form that seems to me to deserve a racial name, and is shortly described below.

If one examines the appendages of the male under a lens, one is confused by the extreme thickness of the end of the abdomen, and by the *variability in position* of the appendages. Usually the inferior prolongation or tooth of the superior appendages can only be seen by actually forcing these appendages upwards out of place, or by depressing the inferiors. From one male in my collection, however, I obtained an excellent profile-drawing showing all the parts, and this is figured in Plate xlviii., fig.4, with the corresponding dorsal view (left half) in fig.3. These figures are needed for comparison with the appendages of *I. torresiana*, n.sp.

Race *tasmanica*.—Differs from the type by its more robust build, very hairy thorax, thick pterostigma, which in the forewing of the male is very black basally and inferiorly; and especially by the brilliance of the blue colouration, which is more widely spread also in the colour-pattern. Antehumeral bands of both sexes very distinct, often of a rich violet-blue colour. Segment 2 of male, instead of being black as in the type, is rich blue above, with a very variable black pattern, the most usual form being that of a black *u*, somewhat square at its base, and connected to the apex of the segment by a more or less thick black stalk. In the female, the *basal two-thirds* of segment 2 are brilliant blue.

Hab. - Tasmania(Launceston, Cressy, Hobart; January, 1909, taken by myself).

[Note :—*I. senegalensis* Rambur, reported from Australia, does not occur, to my knowledge, anywhere on the continent].

23. Ischnura torresiana, n.sp.

♂. *Total length*, 28·5; *abdomen*, 22·5; *hindwing*, 15 mm.

Wings: *pterostigma* 0·5 mm., scarcely covering a whole cellule; that of forewing blackish, nearly surrounded by white, and paler distally; that of hindwing much paler; eight postnodals in fore, seven in hindwing. Head: *post-ocular spots small*, blue; *epicranium* black, a blue band bordering the front; *postclypeus* black; *anteclypeus* bluish; *labrum* blue with a black line above; *labium* pale straw-coloured. Thorax: *prothorax* metallic black, posterior border finely ridged and upturned. *Meso-* and *metathorax practically smooth*, of medium size, black above, the antehumeral stripes reduced to a short blue line on each side close up to prothorax; sides blue, shading to greyish underneath. *Legs* short, blackish, underside of femora bluish. Abdomen fairly slender, cylindrical, 1-2 and 9-10 scarcely wider than the rest. Colour: 1-3 black above, blue on sides, 4-7 metallic bronzy-black above, pale yellow along sides, 8-9 completely blue except for a touch of black near bases, 10 black, *scarcely upturned at tip*. Appendages: *superior* 0·2 mm., blunt, black, with a conspicuous inferior lobe projecting downwards (only visible in profile); *inferior* very thick and truncate. Compared with that of *I. heterosticta*, the end of the abdomen is less upraised, broader dorsally, and the two sets of appendages project about equally beyond it; whereas in *I. heterosticta* the inferior project slightly further than the superior, and are more pointed above(Plate xlviii., figs.5, 6).

♀. *Total length*, 31·5; *abdomen*, 25; *hindwing*, 17·5 mm.

It differs from the male as follows. *Pterostigma* unicolorous, It differs from the male as follows. *Pterostigma* unicolorous, pale grey, between black nervures; those parts of the head which are blue in male are greenish-blue or greenish-grey; *thorax* with a pair of narrow antehumeral bluish stripes; *abdomen* broader; 1, blue; 8-10 and sides of 7 blue, a little black close up to bases; *appendages* 0·3 mm., black, bluntly pointed.

Hab.—Cooktown, N. Queensland; taken by myself, December, 1907, and January, 1908. Banks' Island, Torres Straits (H. Elgner); February, 1910.

Types: ♂♀, Coll. Tillyard.

This species was found flying on a small billabong or backwater of the Annam River, in company with *Prosagrion pruinescens* (see below). The two species are very similar in habits, but easily separated at a glance while flying, owing to their very different colouration. The males of *I. torresiana* shew no signs of pruinescence, and their blue parts are conspicuous; the females appear very similar to the males. On the other hand, the pruinescence of the males of *Prosagrion pruinescens* is very noticeable, while the orange females of that species are very distinct. *I. torresiana* is very closely related to *I. heterosticta* Burm., to which it seems to bear exactly the same relationship that *Austrolestes insularis* does to *A. analis* Ramb.

24. Ischnura pruinescens Tillyard.

Agriocnemis pruinescens Tillyard, *loc. cit.* 1906, p.191(♂ only); *loc. cit.* 1907, p.385(♂♀).

In spite of the position of the second antenodal in this species (placed well before the arculus), it seems inadvisable to separate it from its evidently close allies, *Ischnura heterosticta* Burm., and *I. senegalensis* Ramb., which it resembles in every other character of the genus except the one mentioned. Dr. Ris informs me that he has examined many species of *Ischnura*, from all parts of the world, and, in many species, he has found "*slight degrees* of procession of the arculus distally from the second antenodal crossvein to be a common variety all over the genus." This species may, however, be fairly considered to be a link in the chain connecting the more typical *Ischnura* species with *Agriocnemis*. These two genera are closely allied, and are remarkable in both possessing dimorphic female forms. The peculiar *Ischnura*-form of the male appendages can also be traced down into *Agriocnemis* (see *Agr. hyacinthus*, Plate xlviii., fig.16).

♂. End of segment 10 produced medially into a conspicuous bifurcated projection, so that, viewed dorsally, the end is practically level with the tips of the appendages (Plate xlviii., fig. 8). Appendages: *superior* scarcely 0·2 mm., blunt and depressed, the inferior projection hidden behind the inferiors; *inferior* 0·3 mm., rather pointed above, with a small lower lobe (Plate xlviii., figs. 7, 8).

Hab.—Townsville, Cairns, and Cooktown, N. Queensland; taken by myself, January, 1905 and 1908; also taken by Mr. E. Allen, at Cairns, in June, August, and December. Not common.

Types: ♂ ♀ in Coll. Tillyard.

25. Argiocnemis rubescens Selys.

Bull. Acad. Roy. de Belgique, xliii., 1877, p. 42.

De Selys described only a unique female of this beautiful insect, which is not uncommon. I append a full description:—

♂. *Total length*, 34; *abdomen*, 28; *hindwing*, 18 mm.

Wings slightly clouded with pale brown in the mature insect; *pterostigma* 0·8 mm. in forewing, 1 mm. in hindwing, rhomboidal (upper distal angle *slightly* more acute) pale brown in forewing, the merest shade darker in hindwing; *postnodals* 10 in fore, 8 in hindwing. *Basal postcostal nervule* nearer to second antenodal than to first. Head: *eyes* black above, olive-green beneath; *postocular spots* green; *epicranium* black, *postclypeus* blackish, *anteclypeus* and *labrum* deep olive-green; *labium* pale dirty yellowish-grey. Thorax: *prothorax* black, an olive-green patch in front, posterior ridge with a semicircular projection (Plate xlix., fig. 5). *Meso-* and *metathorax* black, with a pair of rather narrow dark green antehumeral stripes; lower down, on each side, two broader stripes of bright olive-green (or yellowish-green) separated by a band of the black ground-colour; underside pale greenish-white. *Legs* black, except coxæ and part of underside of profemora pale greenish-white. Abdomen:

slender, rather long, 1-2 and 7-10 enlarged. *Colour*: in the *young* male, a beautiful reddish-pink; in the *mature* male, 1-7 deep black, with a small basal olive-green mark on each side, 2 also with a pair of apical spots, and 3-5 with a green line along sides for two-thirds from base; underside brownish; 8-9 brilliant red above, brownish-orange underneath; 10, black above, red on sides. Appendages: *superior* 0·5 mm., red, thick, slightly forcipate, upturned, very downy, blunt; *inferior* 0·3 mm., thick, reddish, upturned, with a rounded hairy inner lobe, and an apical point (viewed dorsally); in profile, sharply truncate, ending above and below in a small black point (Plate xlix., figs. 3, 4).

♀. Very similar in build to ♂, but differing from it as follows:—*Wings* hyaline; *head* paler, *eyes* brown above, pale yellowish-grey beneath; postocular ridge between spots, reddish; *clypeus* deep olive-green. *Prothorax* red, the middle of the posterior lobe prolonged into a conspicuous semi-oval plate, appearing, in profile, like a hook reaching back over the front of the thorax. *Thorax* reddish, with a broad black dorsal band, the red deepening to chocolate-brown in the very mature female; *legs* pale brownish. *Abdomen* slightly stouter, shorter and more cylindrical than in male, 7-9 slightly swollen; colour reddish-pink, with black lines in sutures, gradually darkening with age to chocolate-brown; in *very* mature females, deep velvety-black, except 8-10, dark brown *Appendages* 0·2 mm., divergent, pointed, reddish to brownish-black, according to age.

Hab.—Queensland, as far north as Cooktown, fairly common.—New South Wales, to as far south as Sydney. It is found on small running creeks and rivers, from November to March in New South Wales, but practically all the year round in the tropics.

Types: ♀, unique, Coll. Selys; ♂♀, Coll. Tillyard.

The mature male is very distinct, in colouration, from all other *Agrionidæ* known to me; the female is remarkable in the form of its prothorax.

AUSTROCNEMIS, n.g.

Characters of *Agriocnemis* Selys, but with closer venation, narrower wings, and *remarkably long legs.*

Type: *Agriocnemis splendida* Martin.

It is with M. René Martin's approval, that I propose this new genus for his interesting species, which is clearly not congeneric with the other members of the genus *Agriocnemis* In emphasising the remarkable size of the legs for so small an insect, I should like to point out that this little insect has a great liking for sitting on the floating leaves of water-plants. This liking is shared, to some extent, with many other small *Agrionidæ*, but I remarked, when collecting this species at Alexandra, Victoria, a distinct difference between the habits of this species and others. *Austroagrion cyane* (and, in other localities, other small species have similar habits) visited the floating leaves only occasionally, during bright sunshine; and the females also occasionally oviposited along their edges, but seemed to prefer a less flat surface; as soon as the wind blew much, or the sun became obscured by cloud, this species made for the banks, and hid amongst the reeds or grass. But *Austrocnemis splendida*, using its long legs to some purpose, would remain sitting on the flat, floating surface, facing wind and cloud, with its legs spread widely out, so that it was most difficult to capture. The best way was to plunge the net into the water under it, and so secure it at the cost of drenching the net repeated; wavings of the net above it, failed to frighten it. Towards evening, when the other *Agrionidæ* had retired into the rushes, these little insects could still be seen, with legs outstretched, holding on to their favourite floating leaves.

The habit described above is, without doubt, the explanation why the asthenogenetic process left this one archaic character (viz., the long legs) untouched. Far away in the dim past, some remote ancestor of this species acquired this habit, and held to it; while other *Agrionidæ* were developing their habits of hiding away in the reeds; and so the reduction

process went on affecting the other parts of the insect, and left it with legs out of all proportion to the rest of the insect. This one characteristic possibly takes us back as far as the time when there was, on the earth, a group of *Zygopterid* dragonflies, from which both *Argia* and *Austrocnemis* subsequently descended; a time long before asthenogenesis had produced any of the extremely reduced forms found at the present day.

26. Austrocnemis splendida Martin.

♂. Appendages: *superior* 0·3 mm., black, with coarse yellowish hairs; divergent, thick, truncate; *inferior* 0·25 mm., subtriangular, with very broad bases. (Plate xlviii., figs.9, 10).

Types: ♂♀, Coll. Martin.

Hab.—Alexandra, Victoria; December to February. Also Atherton, N.Q., where I have taken a smaller form of this rare insect.

27. Agriocnemis hyacinthus, n.sp.

Agriocnemis velaris Tillyard, These Proceedings, 1907, xxxii., p. 388.

♂. *Total length*, 21·5; *abdomen*, 17; *hindwing*, 10·5 mm.

Wings: *neuration* brownish; *postnodals* 6 in fore, 5 in hindwing; *pterostigma* 0·5 mm., pale brown in fore, black in hindwing, scarcely covering one cellule. Head: *epicranium* steely black shading to greenish near eyes; an interrupted yellow line along front; *postocular spots* small, blue; *clypeus* black; *labrum* brilliant metallic violet; *labium* pale straw-colour. Thorax: *prothorax* deep bronze finely edged with yellow, sides yellow, posterior lobe projecting backwards medially in a semicircle. *Meso-* and *metathorax* bronze above, with a pair of fine greenish or yellowish antehumeral lines; sides pale greenish or yellowish. *Legs* pale yellow touched with black on tibiæ and tarsi. Abdomen very slender, 1-2 and 7-10 very slightly wider. Colour, 1-7 bronzy-black above, greenish or yellowish underneath; 3-6

with a pair of pale yellow basal marks, very small; 8, basal two-thirds black, apical third and sides red; 9-10 bright red. Appendages: *superior*, 0·15 mm., reddish, wide apart, appearing triangular from above; in profile, bluntly truncate, with a huge inferior lobe pointing downwards; *inferior* very minute, flattish, carying a small black upturned toothlet above, and three similar, but slightly smaller ones, below (Plate xlviii., figs.15-16).

♀. Form A.—This differs from the male as follows:—*Postnodals* 7-8 in fore, 6-7 in hindwing; *pterostigma* pale greyish-brown in all four wings. *Head*: vertex blackish, with postocular spots irregular, brownish; an irregular brownish band along front, *clypeus* reddish, *labrum* brown, *labium* pale yellow. *Prothorax* brown, somewhat swollen or tubercled above on each side of dorsal line; posterior lobe very narrow, not projecting as in male. *Meso-* and *metathorax* dull glaucous-brownish, with a dark olive-green dorsal band. *Abdomen* slightly thicker than in male, 3 somewhat narrowed; *colour* dark olive-green inclining to bronze, sides pale yellowish-brown, sutures of 1-7 with black transverse lines; 8-10 downy with reddish-brown sutures. *Appendages* very short, downy, blunt, reddish-brown.

♀. Form B.—Differs from Form A as follows:—All brown or reddish parts of the head in A, are brick-red in B; thorax brick-red, with a very broad black dorsal band; *abdomen*, 1-3 red, with narrow transverse apical black bands right up to sutures; 4 similar, clouded slightly with brown towards apex; 5 similar, but with the whole of dorsum clouded; 6-8, blackish above, red on sides; 8-10 with red sutures; 9, red with a large black dorsal area narrowing apically; 10, red, with a basal black blotch; appendages as in A.

Hab.—Sydney to Cape York; not uncommon, but very local; November to March.

This insect flies but little, and, on account of its diminutive size and retiring habits, is very easily overlooked. It forms small colonies along the shallow reedy edges of slow-running

creeks and rivers, also of lagoons. It is very fond of sitting on the upright stems of reeds standing in the water; when approached, it moves round the stem to the side opposite the intruder, and sits very close, so that it is almost impossible to see it or to knock it off. The females are seldom met with. Form B is the usual form of female, Form A being exceedingly rare. I have taken Form A only in one colony, on Duck Creek, Auburn, near Sydney.

This insect is the Australian representative of the species described by de Selys* from Ceylon and Java, under the name *Agriocnemis pygmæa* Rambur. It seems doubtful, however, whether Rambur's original type was the same species as that of de Selys. The following are the chief differences between *A. hyacinthus* and the species described by de Selys:—*A. hyacinthus* ♂ is slightly larger (hindwing, 10·5, as against 9·5 mm.); it possesses only five postnodals in hindwing (de Selys' insect six, or rarely seven); it has segments 9-10 and apical third and sides of 8 red, as against 8-10 orange in de Selys' insect; and, most important of all, the *superior* appendages, though of similar form, are distinct in possessing a much larger inferior lobe, while there are only three small teeth or points in a line on the inferior appendages. Also in the ♀ (Form B), the colouration is brick-red, while that of de Selys' insect is orange. The orange and bronze ♀ of de Selys' insect seems to correspond to Form A of the ♀ of *A. hyacinthus*, but is very distinct from it in colouration.

Types: ♂♀, Form A, and ♀ Form B, Coll. Tillyard.

28. Agriocnemis rubricauda, n.sp. (Plate xlvii., fig. 8.).

♂. *Total length*, 20·5 mm.; *abdomen*, 17; *hindwing*, 9·5 mm.

Wings very short and delicate, *neuration* fine, brownish; *pterostigma*, 0·5 mm.: pale brownish on all four wings; *post-*

* Bull. Acad. Roy. de Belgique, xliii., 1877, p.52.

nodals 5-6 in fore, 4 in hindwing. Head: *eyes* dark green (brown when dead); *epicranium* and *clypeus* blackish, *labrum* dark brown, a pale greenish band under clypeal suture; *labium* whitish; *postocular spots* blue, small, elongate-oval. Thorax: *prothorax* black, posterior lobe enlarged into a wide oval plate with upturned edges. *Meso-* and *metathorax* metallic blackish above, a fine green, antehumeral line on each side; sides and underside pale olive-green. *Legs* pale yellowish, touched with black at elbows. Abdomen slender, 1-2 slightly wider, 9-10 slightly clubbed. *Colour*: 1-6 metallic bronzy-black, with pale greenish transverse lines in sutures, sides pale greenish except at apices, when the black from above spreads downwards, underside dull greenish with black ventral carina; 7, brilliant red, with a touch of black at base; 8-10 brilliant red; underside of 7-10 pale straw-colour. End of segment 10 upturned. Appendages: *superior* 0·2 mm., bright red, suboval, slightly forcipate; seen in profile, thick, blunt, slightly depressed; *inferior* scarcely 0·1 mm., rather flat, with thick bases, and with a sharp superiorly-pointed tip (Plate xlviii., figs. 17, 18).

♀. Unknown.

Hab.—Cooktown, N. Queensland. Very rare. December, 1907.

A unique, perfect male, taken by myself; also a damaged male (end segments of abdomen lacking) sent by Mr. E. A. C. Olive, from same locality.

Type: ♂, Coll. Tillyard.

Closely related to *A. minima* Selys* (Java, unique male), from which it differs chiefly as follows:—Only two antenodals (*A. minima* has three); segments 7-10 bright red (8-10 in *A. minima*); postocular spots elongate-oval (in *A. minima*, they are in the form of a "7"); superior appendages about as long as segment 10, less curved, and thicker at tips; also considerably larger size (abdomen of *A. minima* 13 mm.).

* *Loc. cit.*, p.51.

29. AGRIOCNEMIS ARGENTEA Tillyard.

Tillyard, *loc. cit.*, p. 192.

♂. Appendages: *superior* 0·2 mm., black, appearing somewhat pointed from above; viewed in profile, they are very thick, irregularly rounded, with a small upper projecting portion formed by a narrow incision into the main bulk near its upper end; *inferior* less than 0·1 mm., very flat and broad, a tiny black tooth near upper end (Plate xlviii., figs. 11, 12.).

30. AGRIOCNEMIS EXSUDANS Selys.

Selys, *loc. cit.*, p. 54 (unique ♂ from New Caledonia).

Several males of this very rare species were taken by Mr. Alan MacCulloch at Vila, New Hebrides, in August, 1910, and are now in my collection. It is not an Australian species, but, as it is closely related to *A. argentea*, I append a description of its appendages:—

♂. Appendages: *superior* 0·2 mm., brownish, with a large basal black patch; seen from above, they are very broad at base, curving to a fairly pointed tip; in profile, the upper projecting lobe is very thin, the incision wider, and the lower main lobe larger and more rounded than in *A. argentea; inferior* less than 0·1 mm., flat, broad-based, a tiny tooth projecting from the upper end (Plate xlviii., figs. 13, 14.).

30 *bis*. AGRIOCNEMIS MATERNA Hagen et Selys.

Dr. Ris informs me that he has received a fine series of this rare dragonfly from Mr. H. Elgner, taken at Thursday Island. I do not know the species, which I have not received in any consignments from Torres Straits. Hagen's types (♂ ♀) were taken in Sumatra, and are now in the Leyden Museum. This species has never been recorded from Australia before.

These appendages of the Australian species of *Agriocnemis* and allies are of very great interest. If we compare, in Plate xlviii., the profile views of the appendages of *A. argentea* and

A. exsudans with those of *Agrion lyelli*, we cannot fail to notice a similarity in the build of all three. On the other hand, the appendages of *A. hyacinthus* suggest rather those of *Ischnura heterosticta* and *I. torresiana;* while those of *A. rubricauda* and *Austrocnemis splendida* have some slight resemblance (in profile) to those of *Caliagron billinghursti*. These resemblances, together with the proved fact that the Australian species of the genus *Agriocnemis* are larger (less reduced) than their close allies from Java and Ceylon, seem to point us to the following conclusions. The southern representatives of what was, originally, a large bipolar concern (viz. *Agrion*, *Ischnura*, and allied genera) had to face some intense competition which their northern congeners did not meet with. (Probably this was the invasion of their original sphere by the Australian *Lestes*-group). Ousted from this position, the whole southern branch was driven northwards towards the Tropics, and rapid asthenogenesis set in as it fought its way along. A few species held their own (*Agrion lyelli*, *Ischnura heterosticta*); a large number of the more robust forms became reduced to the *Pseudagrion*-form; and some of these, proceeding even further north, degraded to *Stenobasis* and *Telebasis*. The weaker species, still refuging, as far as possible, in their old regions, but driven to asthenogenetic excess by the competition of their more successful rivals, became rapidly reduced to the extreme stages shown in *Agriocnemis* and *Hemiphlebia*. The few of these that worked through Malaysia would, of course, show a still further diminution in size along the most northerly limits of their range. This hypothesis explains not only the types of appendage found in *Agriocnemis*, but also the absence of a large group of *Agrion* and *Ischnura* in the Southern Hemisphere. It also explains how it is that *Agriocnemis* and allies, though driven to extreme asthenogenetic limits, can still exhibit an inferior sector of the triangle as well developed as in *Agrion* itself. What the larger species gained by the reduction of this vein, the smaller gained by extreme reduc-

tion in size, and by the backward shift of the second antenodal. This latter movement in itself may have preserved the inferior sector from further reduction, by preventing the tendency to increased petiolation. Probably, also, the contraction of the southern land-masses to their present rather small dimensions, has been a very great factor in inducing asthenogenetic specialisation in this and other groups.

31. Hemiphlebia mirabilis Selys. (Plate xlix., fig. 21.).

Selys, *loc. cit.*, p. 64.

♂. Appendages: *superior* 0·8 mm., very slightly forcipate, bronzy-black above, creamy beneath; in profile, the tips are flattened and pointed; *inferior* 1·1 mm., flat and wide, appearing narrow and slightly waved from above, but, in profile, thick and doubly curved like a flat S; structure delicate and almost ribbon-like; creamy-white, with delicate soft hairs (Plate xlix., figs. 6, 7).

I do not think that the real use of these remarkable appendages has yet been recorded. At Alexandra, Victoria, the only locality where I have met with this species, I found it sitting about in the dense reed-masses that grow in and around the backwaters of the Goulburn River. It flew but seldom, and then only to pass from one reed to another close by. The male has the remarkable habit of walking slowly up a reed-stalk, raising the end of its abdomen, and *waving it up and down two or three times fairly quickly*, at the same time *displaying the white ribbon-like inferior appendages very conspicuously*. Always, after a short flight, this was done; and again, when the sun came out after a passing cloud or rain-squall, these insects would begin to climb the reeds again, and repeat the performance. Owing to their colouration, it was almost impossible to detect these tiny insects on the dark green reed-stems, *had it not been for this habit;* and I soon began to watch for the display of the white appendages, and by this means secured a number of males.

Afterwards, I was very curious to find out why the males acted in this manner, and began to watch for pairs. Presently, I noticed a female flying gently in a small open space of the reeds, and suddenly, about a yard or so away, a male began showing his "white ensign," with the result that the female flew close to him at once, alighting on the next reed-stem. The female then began to climb up the stem, *moving her abdomen from side to side* in a peculiar manner, and so displaying to the male its creamy-white underside and ovipositor; which, however, are not nearly so conspicuous as the white parts of the male. Finally, the courtship appearing satisfactory, they both flew out from the reeds a few inches, and the male secured the female in the usual manner. I could not see exactly how the female was held, but I think there is no doubt that it is the *superior* appendages that are used as claspers, the inferior being too weak and ribbony to afford a strong grasp. This pair were captured, but disengaged in the net. A similar performance was noticed again later on, and the pair captured. There can be no doubt, therefore, that the males adopt these peculiar tactics to show the females where they are hiding.

Dr. F. F. Laidlaw* records, of *Rhinocypha fenestrella*, that the male "dances in the air before the female, displaying white surface of tibiæ. Mr. E. B. Williamson says that *Calopteryx maculata*, male, displays a shining white ventral apical abdominal spot, while at rest, by "curving the abdomen so that the apex is brought upward and forward, the hindwings meanwhile being fluttered rapidly while the front wings are held motionless." These two cases seem to be undoubted instances of a kind of courtship, so that the habit now recorded for *Hemiphlebia*, is not quite without a parallel, though in some ways more remarkable than either of the above.

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* Fasciculi Malayenses, p. 169.

† Dragonflies of Burma and Lower Siam, *Calopterygina*, p. 175.

Group iii. **Pseudagrion.**

Xanthocnemis, n.g.

Basal postcostal nervule midway between levels of the two antenodals; inferior sector of triangle reaching *just beyond* this nervule in *forewing*, just up to it in hindwing. Venation fairly close, pterostigma slightly elongated, unicolorous. Inferior appendages of male much longer than superiors. Female with prothorax simple and no ventral apical spine on segment 8.

Type: *Xanthagrion zelandicum* Selys (New Zealand).

It is necessary to study this New Zealand species here in conjunction with its Australian allies. A new genus is required for its reception, as it is clearly not congeneric with *Xanthagrion erythroneurum* Selys, the type of the genus *Xanthagrion*. In the form of the inferior sector of the triangle of the forewing, it connects the group *Pseudagrion* with the group *Agrion*. In its colouration and in the form of its appendages, it comes closest to *Ceriagrion*.

32. Xanthocnemis zelandica Selys.

Xanthagrion zelandicum Selys, "Synopsis des Agrionines," Bull. Acad. Roy. de Belgique, xli., 1876, p. 232; *X. antipodum* Selys, and *X. sobrinum* Selys, *loc. cit.*, p. 234, synonymous with *X. zelandicum*.

There is only one variable species included in the above names. It is common all over New Zealand, and varies considerably in size from different localities, also in colouration according to age. Some of the females are very small; one of these is described by de Selys as *X. antipodum*. It seems nearly always to occur in company with *Lestes colensonis* White, the only other known New Zealand *Agrionid*. Where this latter insect is largest, so also is *X. zelandicum*, but I think this variation in size is due as much to the season as to the locality. Specimens of both these species, received from Chatham Island, are exceptionally fine, and the largest of the whole series.

♂. Appendages: *superior* 0·25 mm., short, blunt, reddish; seen from above, they are irregularly rounded, hairy, with an inner projecting lobe touched with black; in profile, they are strongly bifurcated, the upper lobe rather rounded, red, downy, the lower lobe narrow, black. *Inferior* 0·6 mm., narrow, hairy, forcipate, red; in profile, slightly waved, and with narrowing tips (Plate xlix., figs. 12, 13).

33. Xanthagrion erythroneurum Selys. (Plate xlix., fig. 9).

♂. Appendages: *superior* 0·4 mm., subtriangular, well pointed, reddish touched with black, a strong tuft of hairs on middle of inner margin; in profile, they appear thicker, with the upper surface much curved; *inferior* 0·15 m.m., wide, flat, bifurcated, the upper lobe blunt, rounded, tipped with black, lower lobe reddish (Plate xlix., figs. 10, 11.).

These appendages are figured for comparison with those of *Xanthocnemis* (by contrast) and of *Austroagrion;* they will be seen to resemble the latter closely.

It is necessary to emphasise the following characters of the genus *Xanthagrion*, as now constituted after the removal of *X. zelandicum. Basal postcostal nervule placed almost under the level of the first antenodal;* and, hence, wings less petiolate than usual in this group; prothorax of female simple.

Austroagrion, n.g. (Plate xlix., fig. 19).

Basal postcostal nervule about midway between levels of the two antenodals; inferior sector of triangle reaching just up to this nervule. Superior appendages of male not forked or hollowed out; prothorax of female simple. Small species of blue and bronze colouration.

Type: *Pseudagrion cyane* Selys.

This genus is proposed for the reception of the two closely allied, little Australian species, *Pseudagrion cyane* Selys, and *Ps. cæruleum* Tillyard. Dr. F. Ris has lately* removed these

* Die Fauna Südwest-Australiens, 1910, p. 430.

two species from *Pseudagrion* and placed them in *Xanthagrion*, with which they agree in the form of the male appendages and female prothorax. But this arrangement ignores the fundamental venational differences, which, it seems to me, are of a higher order than the sexual characters mentioned above. Also the build, size, and colour-scheme of these two species are all essentially different from those of *X. erythroneurum*. Nevertheless, Dr. Ris was right to emphasise the fact that these two insects do not belong to *Pseudagrion*, from which they differ, not only in the already mentioned sex-characters, but in possessing a less elongated abdomen, and rather broader wings— in fact, they are more of the *Agrion*-build, and probably represent one of the first asthenogenetic offshoots from that type.

34. Austroagrion cyane Selys, *loc. cit.*, p. 218.

35. Austroagrion cœruleum Tillyard.

Pseudagrion cœruleum Tillyard, These Proceedings, 1907, xxxii., p. 739.

The appendages of the males of these two closely allied species, are figured in Plate xlviii., (figs. 27-30). Owing to the matted hairs surrounding the superior appendages, they are most difficult to draw. This has caused a slight error in the outline sketch of the superior appendages of *A. cœruleum* (profile view), as given by Dr. Ris. The appendage is not bluntly truncate, but actually rather pointed, the point being inclined somewhat downwards (upwards in *A. cyane*). On the upper surface, is a thick mat of hairs jutting out about midway, and curling over towards the tip; this gives the appearance of a truncate outline. The differences for the two species are clearly shown in the diagrams. They are closely allied, geminate species, separated by the desert-barrier of South-Central Australia.

Austroagrion cyane Selys, is a very variable species, attaining its highest development in Tasmania and Victoria, where

it is of a robust, almost *Agrion*-build, and where it actually accompanies the only known Australian *Agrion* (*A. lyelli*, n.sp.) on the lagoons. As we trace it northwards, we notice a progressive asthenogenetic tendency, the size becoming smaller, the wings narrower, and the build much more slender. In North Queensland, I found a small race of this species, flying in company with species of *Agriocnemis*, along the margins of lagoons. The extremes in size are given by the following measurements: Tasmanian series—Abdomen, ♂ 23, ♀ 22; hindwing, ♂ 15·5, ♀ 15·5 mm. Cooktown series—Abdomen, ♂19, ♀19·5; hindwing, ♂11·5, ♀13 mm.

Caliagrion, n.g. (Plate xlix., fig.8).

Basal postcostal nervule placed almost under the level of the first antenodal. Venation strong, fairly open. Pterostigma unicolorous, that of hindwing rather elongate. Superior appendages of male pointed, and carrying a large, basal, projecting inner shelf; not forked or hollowed out; inferior shorter. Prothorax of female furnished with two hooks pointing forwards. Large insects, with blue colouration.

Type: *Pseudagrion billinghursti* Martin.

Very distinct from *Pseudagrion* Selys, by the position of the basal postcostal nervule, the robust build, larger size, and the form of the superior appendages; but connected with this genus by the intermediate species *Ps. ignifer* Tillyard, which is retained in *Pseudagrion* on venational and other characters.

36. Caliagrion billinghursti Martin.

Pseudagrion billinghursti Martin, *loc. cit.* p.246.

♂. Appendages: *superior* 0·7 mm., dorsal surface black, inner shelf blue; viewed from above, pointed, with shelf subtriangular, large; in profile, thick, slantingly truncated, with the pointed part uppermost; inferior 0·3, thick, blunt, slightly upturned (Plate xlviii., figs.19, 20).

Hab.—Alexandra, Victoria; National Park, N.S.W. Rare.

Types: ♂♀, Coll. Martin.

Pseudagrion Selys, a me restrictum. (Plate xlix., figs.15, 16).

Basal postcostal nervule about midway between the levels of the two antenodals. Pterostigma unicolorous, short. Venation rather close; wings fairly narrow. Abdomen long and slender. Superior appendages of male bifurcated or hollowed out (except in *Ps. ignifer*); inferior shorter. Prothorax of female furnished with two hooks pointing forwards. Medium to large insects of blue or orange colouration.

Type: *Pseudagrion furcigerum* Rambur; following Selys. But I doubt if, even as now restricted, this genus forms a homogeneous group; the type-species, at any rate, seems to possess some peculiarities not shared by other members of the genus. A careful study may show the necessity of further division; unfortunately, I have seen scarcely any of the non-Australian species.

37. Pseudagrion ignifer Tillyard.

Tillyard, *loc. cit.* p.188.

♂.Appendages: *superior* 0·5 mm., black, with a brown spot or mark, pointed, with a long and moderately broad subtriangular shelf, the inner lobe of which is rounded; in profile, rather thickly sublanceolate, fairly well pointed; *inferior* 0·2 mm., thick, truncate(Plate xlviii., figs.21, 22). This species forms the passage between *Pseudagrion* and *Caliagrion*, being very close to the latter in the form of its appendages, and intermediate in general build, which, though not so robust as in *Caliagrion*, is somewhat more so than in the more typical species of *Pseudagrion*.

Hab.—Cairns, Kuranda, and Cooktown, N. Queensland; Bellinger River, N.S.W. At the latter locality, I took a very fine series distinctly larger and more brightly coloured than my type-series from N. Queensland.

Types: ♂♀, Coll. Tillyard(Kuranda).

38. Pseudagrion australasiæ Selys.

Selys, *loc. cit.*, p.261.

♂.Appendages: *superior* 0·4 mm., bifid, the upper lobe shorter than the lower; a small inner shelf irregularly notched;

inferior 0·2 mm., moderately thick, blunt, with an inferior prolongation ending in a small point(Plate xlviii., figs. 23, 24). (These appendages are figured for comparison with the closely allied species, *Ps. aureofrons*).

Hab.—Queensland and New South Wales, from Cape York down to National Park. The New South Wales examples are larger and more highly coloured than those from Queensland; in particular, two or three males taken by me on the Tweed River, Murwillumbah, in September, 1904, are exceptionally fine specimens.

Types: ♂♀, Coll. Selys.

39. Pseudagrion aureofrons Tillyard.

Tillyard, *loc. cit.*, p.189(♂ only).

♂.Appendages: *superior* 0·4 mm., black, rather thick, straight along outer edge, bifurcated, the upper lobe rounded and slightly longer than the lower; inner projecting shelf large, with a conspicuous incision near the middle; *inferior* 0·15 mm., thick, rather rounded(Plate xlviii., figs.25, 26).

♀.*Total length* 38, *abdomen* 31, *hindwing* 22 mm.

It differs from the male as follows:—*pterostigma* 1 mm., pale greyish-brown, upper distal angle very acute; *postnodals* 11-12 in fore, 9-10 in hindwing. Head: *epicranium* olive-green, postocular spots and a triangular region round ocelli pale yellowish-green; *front* yellowish-green, *postclypeus* dark olive, *anteclypeus*, *labrum* and a strip bordering the eyes yellowish; *labium* dirty whitish. Thorax: *prothorax* olive-green; *meso-* and *metathorax* olive-green, with a black humeral line and broad yellowish-green stripe on each side. *Legs* olive-green touched with black at elbows. Abdomen much stouter than in male, very cylindrical, dark olive-green above, paler on sides; sutures of 2-6 marked with black lines; 2 with the paler pattern of sides encroaching dorsally and apically, isolating a dark irregular area somewhat in the shape of a cross; 3-6, with a dark circular apical patch marked off in the same way, but not separated from the main dorsal pattern (this is much less distinct in 5-6 than in 3-4); 9,

pale olive-green, with dark basal patch; 10, very short, rounded, pale; *appendages* very short, subconical, olive-green. *Underside* with a black ventral stripe from 1-7, 8-10 pale whitish.

Hab.—Atherton, N. Queensland (four males only; January, 1905)—Pallal, N.S.W., abundant on Horton River, December, 1910(many males and a fair number of females taken, of which the type ♀ above described is one); Bellinger River, N.S.W., December, 1911.

Types: ♂♀, Coll. Tillyard.

The type-male from Atherton is a much smaller insect than those from New South Wales; the males from Pallal average 32 mm. in length of abdomen, and 21 mm. for hindwing(against 28 mm. and 18 mm. respectively for the Atherton series). The colouring of the New South Wales examples is also fuller and more brilliant. It is a most wonderfully beautiful insect, the contrast of the golden-orange and sky-blue being almost beyond description, as it skims its zigzag path in and out of the river-banks, always very close to the surface of the water.

40. Ceriagrion glabrum Burm.

Selys, *loc. cit.*, p.237; Tillyard, *loc. cit.*, p.191.

In Plate xlix., figs.17, 18, I have figured the appendages of a male from Cairns, N. Queensland. Queensland specimens agree in all particulars with Selys' description(types from Central and South Africa) except in being of smaller size, and in the form of the superior appendages of the male, which Selys calls "*reniform*"; a word that might, with a little imagination, be allowed for the profile view, but certainly not for the dorsal view. However, I do not think this is an important difference, as de Selys evidently intended to convey the idea of a rounded and somewhat "nodding" appendage.

These appendages should be contrasted with those of *Xanthocnemis zelandica*(figs.12, 13), when the very great difference will be at once noted. The inferior appendages of *C. glabrum* project only *just beyond* the superiors.

Group iv. **Telebasis.**

ACIAGRION Selys. (Plate xlix., fig.22).

Selys, "*Odonates de Birmanie*," 1891, p.77.

This genus forms the passage between Groups iii.(*Pseudagrion*), and iv.(*Telebasis*), but should most certainly be included in the latter, on account of its excessively slender build, and the very close approximation of the median sector to the nodal vein. I consider this genus, and also *Stenobasis*, to be very close to *Pseudagrion* itself; they are, in fact, the same race of insects just one stage removed asthenogenetically, and preserving the same colour-pattern and habits. Selys himself originally described the type-species, *Aciagrion hisopa*, as a race of *Pseudagrion microcephalum*, while I have to confess that my three males of *Stenobasis mimetes*, n.sp., completely deceived me at first, and were placed merely at a glance, without any thought of differences, into my series of the variable *Pseudagrion australasiæ;* doubtless in both cases we were misled by the remarkable similarity of the colour-pattern.

41. ACIAGRION FRAGILIS Tillyard.

Ischnura fragilis Tillyard, *loc. cit.*, p.186.

Specimens of this insect were forwarded to M. René Martin, who is acquainted with the type-species, *A. hisopa*, and determined by him to be *Aciagrion*, without any doubt.

♂.Appendages: *superior* 0·25mm., black, bluntly subtriangular, divergent; *inferior* 0·15 mm., rounded(Plate xlviii., figs.31, 32).

Types : ♂♀, Coll. Tillyard.

Hab.—Atherton and Cooktown, N. Queensland.

42. STENOBASIS MIMETES, n.sp.(Plate xlvi., fig.21, 22).

♂.*Total length* 40, *abdomen* 33, *hindwing* 22 mm.

Wings: inferior sector of triangle reaching *just up to* basal postcostal nervule, which is placed slightly nearer to the level of the second antenodal than the first. *Pterostigma* 0·6 mm., nearly square, slanting slightly outwards; dark grey, with distal inferior border slightly paler; covering less than one cellule; 12-13 *postnodals.* Hind wing-joins very prominent, black. Head: (colours

faded) *vertex* blue, with a transverse black band between eyes; *postocular spots* blue, round; *postclypeus* black, *anteclypeus* blue, *labrum* metallic black, *labium* pale brownish. Thorax: *prothorax* black; posterior border narrow, blue. *Meso-* and *metathorax* marked as follows:—a narrow black band along dorsal ridge; on each side of it a fine blue line, then a broader band of olive-green, carrying a black spot about one-third of the way from interalar ridge, then a broad humeral blue band; followed, on sides, by a lateral band of olive-green and a sublateral band of blue; finally, a small pointed area of olive-green close to abdomen. *Legs* short, black, except underside of femora, grey. Abdomen very slender, 1-2 and 7-10 slightly enlarged. *Colour* (rather faded) 1-2 blue, 3-7 black or bronzy-black, 8-10 blue. Appendages: *superior* 0·4 mm., black, thick, blunt, bifid, with a small narrow inner plate; *inferior* 0·3 mm., rounded, appearing flatly triangular in profile(Plate xlvi., figs.19, 20).

♀.Unknown.

Hab.—N. Queensland: Cairns, October, 1906, and January, 1909(E. Allen); Cooktown, February, 1910(E. A. C. Olive).

Type: ♂,Coll. Tillyard.

Evidently rare, but probably often overlooked owing to the remarkable similarity between it and the commoner *Pseudagrion australasiæ*. I have named it *mimetes* because of this resemblance.

43. Telebasis rufithorax Selys.

Selys, *loc. cit.*, p.28(type from Obi Isle, between Celebes and New Guinea).

I have received, from Mr. H. Elgner, a good series of this insect from Cape York, and also from Banks' Island, Torres Straits, the captures ranging from October, 1909, to March, 1910. This is the first record of a *Telebasis* occurring in Australia. The appendages of the male (figured in Plate xlviii., figs.33, 34) agree almost exactly with Selys' description; length 0·5 mm.

Appendix. Names of common Australian *Agrionidæ* not dealt with in this paper are:—*Podopteryx roseonotata* Selys, *Synlestes weyersi* Selys, *Austrolestes cingulatus* Burm., *A. pysche* Hagen et

Selys, *A. io* Selys, *A. leda* Selys, *A. annulosus* Selys, *A. analis* Rambur, *Ischnura aurora* Br.,(= *I. delicata* Selys); nine species. Total number of *Agrionidæ* now recorded from Australia, fifty.

EXPLANATION OF PLATES XLIV.-XLIX.

Plate xliv.

Legion **Podagrion.**

Fig.1.—*Argiolestes icteromelas* Selys, ♂, appendages, dorsal view, right side.
Fig.2.—*Argiolestes icteromelas* Selys, ♂, appendages, profile view.
Fig.3.—*Argiolestes griseus* Selys, ♂, appendages, dorsal view, right side.
Fig.4.—*Argiolestes griseus* Selys, ♂, appendages, profile view.
Fig.5.—*Argiolestes amabilis* Foërster, ♂, appendages, dorsal view, left side.
Fig.6.—*Argiolestes amabilis* Foërster, ♂, appendages, profile view.
Fig.7.—*Argiolestes alpinus*, n.sp., ♂, appendages, dorsal view, left side.
Fig.8.—*Argiolestes alpinus*, n.sp., ♂, appendages, profile view.
Fig.9.—*Argiolestes fontanus*, n.sp., ♂, appendages, dorsal view, right side.
Fig.10.—*Argiolestes fontanus*, n.sp., ♂, appendages, profile view.

All figures × 40.

Plate xlv.

Legion **Podagrion.**

Fig.1.—*Argiolestes aureus* Tillyard, ♂, appendages, dorsal view, left side.
Fig.2.—*Argiolestes aureus* Tillyard, ♂, appendages, profile view.
Fig.3.—*Argiolestes minimus* Tillyard, ♂, appendages, dorsal view, right side.
Fig.4.—*Argiolestes minimus* Tillyard, ♂, appendages, profile view.

Legion **Lestes.**

Fig.5.—*Austrolestes aridus* Tillyard, ♂, appendages, dorsal view, right side.
Fig.6.—*Austrolestes aridus* Tillyard, ♂, appendages, profile view.

Fig.7.—*Austrolestes paludosus* Tillyard, ♂, appendages, dorsal view, right side.
Fig.8.—*Austrolestes paludosus* Tillyard, ♂, appendages, profile view.
Fig.9.—*Austrolestes tenuissimus* Tillyard, ♂, appendages, dorsal view, right side.
Fig.10.—*Austrolestes tenuissimus* Tillyard, ♂, appendages, profile view.
Fig.11.—*Austrolestes alleni*, n.sp., ♂, appendages, dorsal view, right side.
Fig.12.—*Austrolestes alleni*, n.sp., ♂, appendages, profile view.
Fig.13.—*Austrolestes insularis*, n.sp., ♂, appendages, dorsal view, right side.
Fig.14.—*Austrolestes insularis*, n.sp., ♂, profile view of apical portion of superior appendages.

All figures × 35.

Plate xlvi.

Legion **Lestoidea.**

Fig.1.—*Lestoïdea conjuncta*, n.sp., ♂, appendages, dorsal view, right side.
Fig.2.—*Lestoïdea conjuncta*, n.sp., ♂, appendages, profile view (with spinelets omitted).

Legion **Protoneura.**

Fig.3.—*Nososticta solida* Selys, ♂, appendages, dorsal view, right side.
Fig.4.—*Nososticta solida* Selys, ♂, appendages, profile view.
Fig.5.—*Notoneura solitaria* Tillyard, ♂, appendages, dorsal view, left side.
Fig.6.—*Notoneura solitaria* Tillyard, ♂, appendages, profile view.
Fig.7.—*Notoneura cœlestina* Tillyard, ♂, appendages, dorsal view, right side.
Fig.8.—*Notoneura cœlestina* Tillyard, ♂, appendages, profile view.
Fig.9.—*Isosticta simplex* Martin, ♂, appendages, dorsal view, left side.
Fig.10.—*Isosticta simplex* Martin, ♂, appendages, profile view.
Fig.11.—*Isosticta banksi*, n.sp., ♂, appendages, dorsal view, right side.
Fig.12.—*Isosticta banksi*, n.sp., ♂, appendages, profile view.
Fig.13.—*Austrosticta fieldi* Tillyard, ♂, appendages, dorsal view, right side.

Fig.14.—*Austrosticta fieldi* Tillyard, ♂, appendages, profile view.
Fig.15.—*Neosticta canescens*, n.sp., ♂, appendages, dorsal view, right side.
Fig.16.—*Neosticta canescens*, n.sp., ♂, appendages, profile view.
Fig.17.—*Oristicta filicicola*, n.sp., ♂, appendages, dorsal view, right side.
Fig.18.—*Oristicta filicicola*, n.sp., ♂, appendages, profile view.

Legion **Agrion.**

Fig.19.—*Stenobasis mimetes*, n.sp., ♂, appendages, dorsal view, right side.
Fig.20.—*Stenobasis mimetes*, n.sp., ♂, appendages, profile view.
Fig.21.—*Stenobasis mimetes*, n.sp., ♂, *a* hindwing, *b* quadrilateral of forewing.
Fig.22.—*Stenobasis mimetes*, n.sp., ♂, tarsus, *a* from above, *b* seen sideways (Note the absence of the inferior tooth or spine).

All figures × 30, except Figs. 21 and 22, × 4½.

Plate xlvii.

Legion **Lestoidea.**

Fig.1.—*Lestoïdea conjuncta*, n.sp., ♂, hindwing; 1*a*, part of forewing.

Legion **Protoneura.**

Fig.2.—*Nososticta solida* Selys, ♂, hindwing; 2*a*, a variation in form of superior sector of triangle.
Fig.3.—*Notoneura solitaria* Tillyard, ♂, hindwing.
Fig.4.—*Isosticta banksi*, n.sp., ♂, hindwing.
Fig.5.—*Austrosticta fieldi* Tillyard, ♂, hindwing.
Fig.6.—*Neosticta canescens*, n.sp., ♂, hindwing.
Fig.7.—*Oristicta filicicola*, n.sp., ♂, hindwing.

Legion **Agrion.**

Fig.8.—*Agriocnemis rubricauda*, n.sp., ♂, hindwing.

All figures × 4½, except Fig. 8, × 7.

Plate xlviii.

Legion **Agrion.**

Fig.1.—*Agrion lyelli*, n.sp., ♂, appendages, dorsal view, right side.
Fig.2.—*Agrion lyelli*, n.sp., ♂, appendages, profile view.
Fig.3.—*Ischnura heterosticta* Burm., ♂, appendages, dorsal view, left side.

Fig.4.—*Ischnura heterosticta* Burm., ♂, appendages, profile view.

Fig.5.—*Ischnura torresiana*, n.sp., ♂, appendages, dorsal view, right side.

Fig.6.—*Ischnura torresiana*, n.sp., ♂, appendages, profile view.

Fig.7.—*Ischnura pruinescens* Tillyard, ♂, appendages, dorsal view, right side.

Fig.8.—*Ischnura pruinescens* Tillyard, ♂, appendages, profile view.

Fig.9.—*Austrocnemis splendida* Martin, ♂, appendages, dorsal view.

Fig.10.—*Austrocnemis splendida* Martin, ♂, appendages, profile view.

Fig.11.—*Agriocnemis argentea* Tillyard, ♂, appendages, dorsal view.

Fig.12.—*Agriocnemis argentea* Tillyard, ♂, appendages, profile view.

Fig.13.—*Agriocnemis exsudans* Selys, ♂, appendages, dorsal view.

Fig.14.—*Agriocnemis exsudans* Selys, ♂, appendages, profile view.

Fig.15.—*Agriocnemis hyacinthus*, n.sp., ♂, appendages, dorsal view.

Fig.16.—*Agriocnemis hyacinthus*, n.sp., ♂, appendages, profile view.

Fig.17.—*Agriocnemis rubricauda*, n.sp., ♂, appendages, dorsal view.

Fig.18.—*Agriocnemis rubricauda*, n.sp., ♂, appendages, profile view.

Fig.19.—*Caliagrion billinghursti* Martin, ♂, appendages, dorsal view, left side

Fig.20.—*Caliagrion billinghursti* Martin, ♂, appendages, profile view.

Fig.21.—*Pseudagrion ignifer* Tillyard, ♂, appendages, dorsal view, left side.

Fig.22.—*Pseudagrion ignifer* Tillyard, ♂, appendages, profile view.

Fig.23.—*Pseudagrion australasiae* Selys, ♂, appendages, dorsal view, right side.

Fig.24.—*Pseudagrion australasiae* Selys, ♂, appendages, profile view.

Fig.25.—*Pseudagrion aureofrons* Tillyard, ♂, appendages, dorsal view, left side.

Fig.26.—*Pseudagrion aureofrons* Tillyard, ♂, appendages, profile view.
Fig.27.—*Austroagrion cyane* Selys, ♂, appendages, dorsal view, right side.
Fig.28.—*Austroagrion cyane* Selys, ♂, appendages, profile view.
Fig.29.—*Austroagrion cæruleum* Tillyard, ♂, appendages, dorsal view, left side.
Fig.30.—*Austroagrion cæruleum* Tillyard, ♂, appendages, profile view.
Fig.31.—*Aciagrion fragilis* Tillyard, ♂, appendages, dorsal view, left side.
Fig.32.—*Aciagrion fragilis* Tillyard, ♂, appendages, profile view.
Fig.33.—*Telebasis rufithorax* Selys, ♂, appendages, dorsal view, left side.
Fig.34.—*Telebasis rufithorax* Selys, ♂, appendages, profile view.

All figures × 30.

Plate xlix.

Legion **Agrion.**

Fig.1.—*Agrion lyelli*, n.sp., ♂, abdomen, to show colour pattern (×6).
Fig.2.—*Agrion lyelli*, n.sp., ♀, abdomen, to show colour pattern (×6).
Fig.3.—*Argiocnemis rubescens* Selys, ♂, appendages, dorsal view, left side (×40).
Fig.4.—*Argiocnemis rubescens* Selys, ♂, appendages, profile view (×40).
Fig.5.—*Argiocnemis rubescens* Selys, ♂, prothorax (×6).
Fig.6.—*Hemiphlebia mirabilis* Selys, ♂, appendages, dorsal view, right side (×40).
Fig.7.—*Hemiphlebia mirabilis* Selys, ♂, appendages, profile view (×40).
Fig.8.—*Caliagrion billinghursti* Martin, ♂, part of hindwing (×8).
Fig.9.—*Xanthagrion erythroneurum* Selys, ♂, part of hindwing (×8).
Fig.10.—*Xanthagrion erythroneurum* Selys, ♂, appendages, dorsal view, left side (×40).
Fig.11.—*Xanthagrion erythroneurum* Selys, ♂, appendages, profile view, (×40).
Fig.12.—*Xanthocnemis zelandica* Selys, ♂, appendages, dorsal view, right side, (×40).
Fig.13.—*Xanthocnemis zelandica*, Selys, ♂, appendages, profile view (×40).

Fig.14.—*Ischnura pruinescens* Tillyard, ♂, part of hindwing (×8).
Fig.15.—*Pseudagrion australasiæ* Selys, ♂, part of hindwing (×8)
Fig.16.—*Pseudagrion aureofrons* Tillyard, ♀, prothorax (×6).
Fig.17.—*Ceriagrion glabrum*, Burm., ♂, appendages, dorsal view, left side (×40).
Fig.18.—*Ceriagrion glabrum* Burm., ♂, appendages, profile view (×40).
Fig.19.—*Austroagrion cyane* Selys, ♂, part of hindwing (×8).
Fig.20.—*Agrion lyelli*, n.sp., ♂, part of hindwing (×8).
Fig.21.—*Hemiphlebia mirabilis* Selys, ♂, part of hindwing (×8).
Fig.22.—*Aciagrion fragilis* Tillyard, ♂, tarsus(×6). Notice small inferior spinelet.